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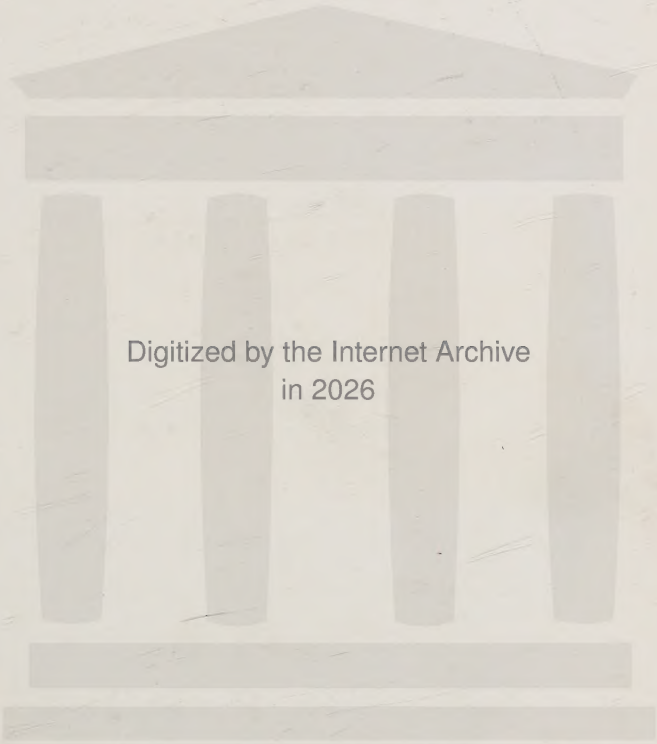
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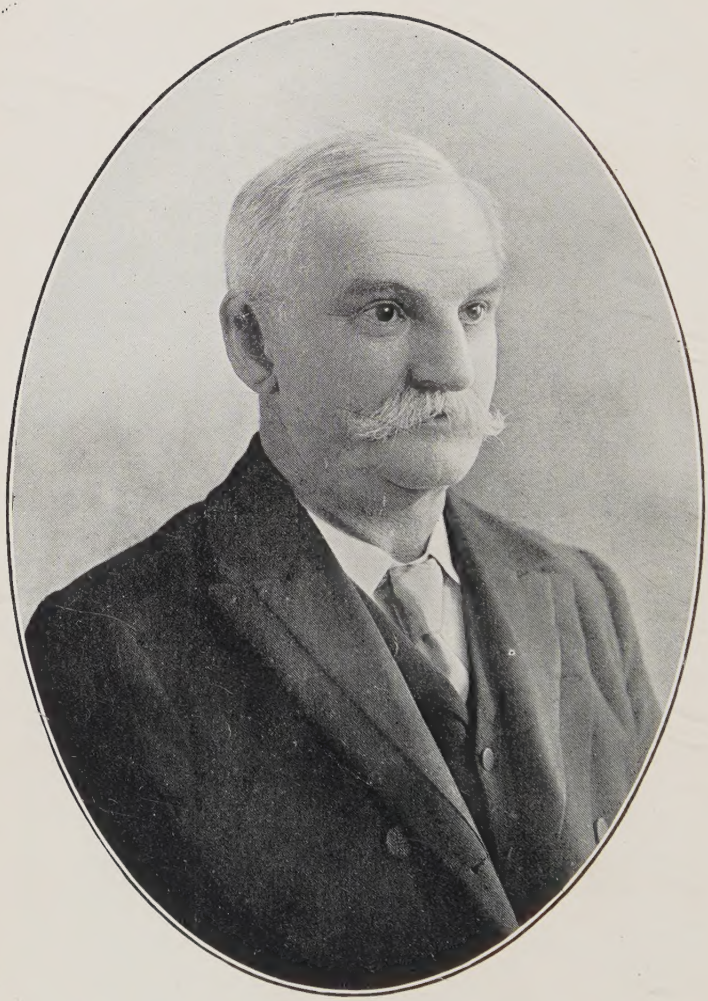

W. F. WELLS, Ph. C., L.P.S.I.

President 1910–11.

YEAR-BOOK OF PHARMACY

COMPRISING

ABSTRACTS OF PAPERS

RELATING TO

PHARMACY, MATERIA MEDICA, AND CHEMISTRY

CONTRIBUTED TO BRITISH AND FOREIGN JOURNALS

FROM JULY 1, 1910, TO JUNE 30, 1911,

WITH THE

TRANSACTIONS

OF THE

BRITISH PHARMACEUTICAL CONFERENCE

AT THE

FORTY-EIGHTH ANNUAL MEETING

HELD IN

PORTSMOUTH,

JULY, 1911.

EDITOR OF THE ABSTRACTS,
J. O. BRAITHWAITE.

EDITOR OF THE TRANSACTIONS,
HORACE FINNEMORE, B.Sc., F.I.C.

LONDON
J. & A. CHURCHILL, 7, GREAT MARLBOROUGH STREET
1911.

British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following :—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of the Science and Practice of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.
2. The minimum subscription shall be 7*s.* 6*d.* annually, which shall be due in advance upon January 1.
3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.
4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.
5. The Officers of the Conference shall be a President, a number of Vice-presidents not exceeding six, by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.
6. At each Conference it shall be determined at what place and time to hold that of the next year.
7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.
8. The Executive Committee shall present a report of proceedings annually.
9. These rules shall not be altered except at an annual meeting of the members.
10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

*** *Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf.*, 17, *Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.*

FORM OF NOMINATION.

I Nominate

(*Name*) .....

(*Address*) .....

as a Member of the British Pharmaceutical Conference.

.....*Member*

Date .....

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary Brit. Pharm. Conf.*, 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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BRITISH PHARMACEUTICAL CONFERENCE

OFFICERS FOR 1911-1912.

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SIR EDWARD EVANS.

VICE-PRESIDENTS,

Who have filled the office of President.

S. R. ATKINS, J.P., Salisbury.
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FRANCIS RANSOM, F.C.S., Hitchin.
W. F. WELLS, PH.C., L.P.S.I., Dublin.

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HONORARY LOCAL SECRETARY.

THOS. STEPHENSON, 137, George Street, Edinburgh.

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D. LLOYD HOWARD, London.

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,, WEST INDIES	A. JAMES TAITT, Port of Spain.

BRITISH PHARMACEUTICAL CONFERENCE.

INAUGURAL MEETING HELD AT NEWCASTLE-ON-TYNE IN 1863.

Years	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries.*
1864	Bath . . .	HENRY DEANE, F.L.S.	Prof. BENTLEY. F.L.S. Dr. EDWARDS, F.C.S. R. W. GILES, F.C.S. Prof. REDWOOD, F.C.S.	J. C. POOLEY.
1865	Birmingham	HENRY DEANE, F.L.S.	Prof. BENTLEY, F.L.S. Dr. EDWARDS, F.C.S. W. SOUTHALL. J. P. TYLEE.	W. SOUTHALL, Jun.
1866	Nottingham	Prof. BENTLEY, F.L.S.	Dr. EDWARDS, F.C.S. D. HANBURY, F.R.S. SAMUEL PARR. W. W. STODDART, F.G.S.	J. H. ATHERTON, F.C.S.
1867	Dundee . .	Prof. BENTLEY, F.L.S.	D. HANBURY, F.R.S. J. INCE, F.L.S. D. RUSSELL. W. W. STODDART, F.G.S.	J. HODGE.
1868	Norwich .	DANIEL HANBURY, F.R.S.	R. FITCH, F.G.S. J. INCE, F.L.S. W. W. STODDART, F.G.S. J. R. YOUNG.	F. SUTTON, F.C.S.
1869	Exeter . .	DANIEL HANBURY, F.R.S.	G. COOPER. H. S. EVANS, F.C.S. J. INCE, F.L.S. W. W. STODDART, F.G.S.	M. HUSBAND.
1870	Liverpool .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. H. S. EVANS, F.C.S. J. INCE, F.L.S.	E. DAVIES, F.C.S. J. DUTTON (Birkenhead).
1871	Edinburgh .	W. W. STODDART, F.C.S.	J. ABRAHAM. H. C. BAILDON. J. INCE, F.L.S. J. WILLIAMS, F.C.S.	J. MACKAY, F.C.S.
1872	Brighton .	H. B. BRADY, F.R.S.	J. INCE, F.L.S. R. REYNOLDS, F.C.S. W. D. SAVAGE. J. WILLIAMS, F.C.S.	T. GLAISYER.
1873	Bradford .	H. B. BRADY, F.R.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. F. M. RIMMINGTON, F.C.S. J. WILLIAMS, F.C.S.	R. PARKINSON, Ph.D.
1874	London. .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. CHAS. H. SAVORY. J. WILLIAMS, F.C.S.	M. CARTEIGHE, F.C.S.
1875	Bristol . .	THOS. B. GROVES, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. CHAS. BOORNE. PETER SQUIRE, F.L.S.	J. PITMAN.
1876	Glasgow .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. E. C. C. STANFORD, F.C.S. D. FRAZER.	A. KINNINMONT.
1877	Plymouth .	Prof. REDWOOD, F.C.S.	T. H. HILLS, F.C.S. R. REYNOLDS, F.C.S. A. P. BALKWILL. J. WILLIAMS, F.C.S.	R. J. CLARK.
1878	Dublin . .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE, F.C.S. R. REYNOLDS, F.C.S. R. W. PRING, L.A.H.D. J. WILLIAMS, F.C.S.	W. HAYES.
1879	Sheffield .	G. F. SCHACHT, F.C.S.	Prof. TICHBORNE. F.C.S. R. REYNOLDS, F.C.S. W. WARD, F.C.S. J. WILLIAMS, F.C.S.	H. MALEHAM.
1880	Swansea .	W. SOUTHALL, F.L.S.	R. REYNOLDS, F.C.S. G. W. SANDFORD. W. WARD, F.C.S. N. M. GROSE.	J. HUGHES.
1881	York . .	R. REYNOLDS, F.C.S.	Prof. ATTFIELD, F.R.S. R. DAVISON. N. M. GROSE. C. UMNEY, F.C.S.	J. SOWRAY.
1882	Southampton	Prof. ATTFIELD, F.R.S.	R. CHIPPERFIELD. T. GREENISH, F.C.S. Prof. TICHBORNE, LL.D. J. R. YOUNG.	O. R. DAWSON.

BRITISH PHARMACEUTICAL CONFERENCE.

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries.*
1883	Southport .	Prof. ATTFIELD, F.R.S.	M. CARTEIGHE, F.C.S. W. V. RADLEY. C. UMNEY, F.C.S. J. R. YOUNG.	WM. ASHTON.
1884	Hastings .	J. WILLIAMS, F.C.S.	S. R. ATKINS. J. BELL. M. CARTEIGHE, F.C.S. J. R. YOUNG.	F. ROSSITER.
1885	Aberdeen .	J. B. STEPHENSON.	F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S. C. EKIN, F.C.S. J. P. KAY.	A. STRACHAN.
1886	Birmingham	T. GREENISH, F.C.S.	T. BARCLAY. F. B. BENGER, F.C.S. M. CARTEIGHE, F.C.S. C. EKIN, F.C.S.	CHAS. THOMPSON.
1887	Manchester	S. R. ATKINS, J.P.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. G. S. WOOLLEY.	F. B. BENGER, F.C.S.
1888	Bath . .	F. B. BENGER, F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. W. MARTINDALE, F.C.S.	H. HUTTON.
1889	Newcastle-on-Tyne	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. C. SYMES, Ph.D. N. H. MARTIN, F.L.S.	T. M. CLAGUE.
1890	Leeds . .	C. UMNEY, F.I.C., F.C.S.	M. CARTEIGHE, F.C.S. S. PLOWMAN, F.R.C.S. A. KINNINMONT, F.C.S. W. SMEETON.	F. W. BRANSON, F.C.S.
1891	Cardiff . .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. A. KINNINMONT, F.C.S. J. C. THRESH, M.B., D.Sc. J. MUNDAY.	ALFRED COLEMAN.
1892	Edinburgh .	E. C. C. STANFORD, F.C.S.	M. CARTEIGHE, F.C.S. W. GILMOUR, F.R.S.E. J. C. THRESH, M.B., D.Sc. J. R. YOUNG, J.P.	PETER BOA.
1893	Nottingham	OCTAVIUS CORDER.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. R. FITZ HUGH.	C. A. BOLTON.
1894	Oxford . .	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. R. H. DAVIES, F.C.S. W. HAYES. G. T. PRIOR.	H. MATHEWS.
1895	Bournemouth	N. H. MARTIN, F.L.S., F.R.M.S.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. W. HAYES. J. A. TOONE.	STEWART HARDWICK.
1896	Liverpool .	W. MARTINDALE, F.C.S.	M. CARTEIGHE, F.C.S. J. LAIDLAW EWING. M. CONROY, F.C.S. W. HAYES.	T. H. WARDLEWORTH. H. O. DUTTON (Birkenhead).
1897	Glasgow .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. W. F. WELLS. R. MCADAM.	J. A. RUSSELL.
1898	Belfast . .	Dr. C. SYMES, Ph.C.	WALTER HILLS. J. LAIDLAW EWING. J. C. C. PAYNE, J.P. W. F. WELLS.	R. W. MCKNIGHT. W. J. RANKIN.
1899	Plymouth .	J. C. C. PAYNE, J.P., Ph.C.	WALTER HILLS, F.C.S. R. J. DOWNES. JOHN MOSS, F.I.C., F.C.S. C. J. PARK.	J. DAVY TURNEY.
1900	London . .	E. M. HOLMES, F.L.S., Ph.C.	R. J. DOWNES, Ph.C. WALTER HILLS, F.C.S. JOHN MOSS, F.I.C., F.C.S. J. F. HARRINGTON, Ph.C.	W. WARREN. HERBERT CRACKNELL.
1901	Dublin . .	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA, F.C.S. Prof. TICHBORNE, Ph.D.	J. I. BERNARD.

BRITISH PHARMACEUTICAL CONFERENCE.

Years.	*Places of Meeting.*	*Presidents.*	*Vice-Presidents.*	*Local Secretaries.*
1902	Dundee .	G. C. DRUCE, M.A., F.L.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. CHAS. KERR. W. A. H. NAYLOR, F.I.C., F.C.S.	W. CUMMINGS.
1903	Bristol . .	T. H. W. IDRIS, M.P., F.C.S.	G. T. W. NEWSHOLME, F.C.S. G. D. BEGGS, M.P.S.I. PETER BOA. W. A. H. NAYLOR, F.I.C., F.C.S. J. W. WHITE.	H. E. BOORNE.
1904	Sheffield .	T. H. W. IDRIS, M.P., F.C.S.	G. D. BEGGS, M.P.S.I. D. B. DOTT, F.R.S.E., F.I.C. W. A. H. NAYLOR, F.I.C., F.C.S. G. T. W. NEWSHOLME, F.C.S. F. RANSOM, F.C.S.	H. ANTCLIFFE.
1905	Brighton .	W. A. H. NAYLOR, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. J. MONTGOMERY. W. H. GIBSON. F. RANSOM. H. G. GREENISH.	W. W. SAVAGE. C. G. YATES.
1906	Birmingham	W. A. H. NAYLOR, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. W. F. WELLS. F. RANSOM. H. G. GREENISH. T. BARCLAY.	C. THOMPSON
1907	Manchester .	THOS. TYRER, F.I.C., F.C.S.	R. A. ROBINSON. D. B. DOTT. J. A. WALSH. F. RANSOM. H. G. GREENISH. G. S. WOOLLEY.	W. KIRKBY
1908	Aberdeen .	ROBT. WRIGHT, F.C.S.	J. R. YOUNG. G. LUNAN. J. A. WALSH. W. GILES. H. G. GREENISH. F. RANSOM.	W. F. HAY.
1909	Newcastle .	J. F. TOCHER, B.Sc., F.I.C.	J. R. YOUNG. G. LUNAN. J. SMITH. GEORGE WEDDELL. F. RANSOM. H. G. GREENISH.	T. M. CLAGUE. H. W. NOBLE.
1910	Cambridge .	FRANCIS RANSOM, F.C.S.	J. F. HARRINGTON J. P. GILMOUR. J. REYNOLDS GREEN, Sc.D., F.R.S. JOHN SMITH. EDMUND WHITE, B.Sc., F.I.C. HENRY G. GREENISH, F.I.C.	A. A. DECK. T. J. MALLETT.
1911	Portsmouth	W. F. WELLS, PH.C.	J. F. HARRINGTON. J. P. GILMOUR. HENRY G. GREENISH, F.I.C. JOHN SMITH. EDMUND WHITE, B.Sc., F.I.C. T. A. WHITE.	T. O. BARLOW. T. POSTLE-THWAITE.

TREASURERS (One).

1863 to 1870, H. B. BRADY, F.R.S.
1870 to 1877, GEORGE F. SCHACHT, F.C.S.
1877 to 1884, C. EKIN, F.C.S.
1884 to 1888, C. UMNEY, F.I.C., F.C.S.
1888 to 1890, W. MARTINDALE, F.C.S.
1890 to 1893, R. H. DAVIES, F.I.C., F.C.S.
1893 to 1898, JOHN MOSS, F.I.C., F.C.S.
1898 to , JOHN C. UMNEY, Ph.C., F.C.S.

HONORARY GENERAL SECRETARIES (Two).

1863 to 1880, Prof. ATTFIELD, Ph.D., F.R.S.
1863 to 1871, RICHARD REYNOLDS, F.C.S.
1871 to 1884, F. BADEN BENGER, F.C.S.
1880 to 1882, M. CARTEIGHE, F.C.S.
1882 to 1886, SIDNEY PLOWMAN, F.R.C.S.
1884 to 1890, JOHN C. THRESH, M.B., D.Sc.
1886 to 1901, W. A. H. NAYLOR, F.I.C., F.C.S.
1890 to 1903, F. RANSOM, F.C.S.
1903 to 1909, EDMUND WHITE, B.Sc., F.I.C.
1901 to , E. SAVILLE PECK, M.A.
1909 to , HORACE FINNEMORE B.Sc., F.I.C.

LOCAL CORRESPONDING SECRETARIES.

District.	*Name.*	*District.*	*Name.*
Aberdeen	W. GILES.	Kendal	G. VOGT.
Barnet	R. F. YOUNG.	Kirkcaldy	DAVID STORRAR.
Belfast	W. J. RANKIN.	Leamington	H. HUTTON.
Birmingham	C. THOMPSON.	Leeds	F. P. SARGEANT.
Blackburn	R. LORD GIFFORD.	Leicester	LEWIS OUGH.
Bournemouth	STEWART HARDWICK.	Malvern	A. MANDER.
		Manchester	C. A. JOHNSTONE.
Bridge of Allan	J. BAIN.	Montrose	A. DAVIDSON.
		Morpeth	J. WHITTLE.
Brighton and Hove	R. A. CRIPPS.	Newcastle-on-Tyne	T. MALTBY CLAGUE.
Bristol	H. E. BOORNE.	Newport (Mon.)	E. DAVIS.
Burton-on-Trent	G. WRIGHT.	Nottingham	G. J. R. PARKES.
Buxton	R. WRIGHT.	Nuneaton	G. ILIFFE.
Cambridge	E. SAVILLE PECK.	Oxford	G. CLARIDGE DRUCE.
Carlisle	J. HALLAWAY.	Paisley	A. FRASER.
Cheltenham	F. J. PALMER.	Peterhead	J. F. TOCHER.
Chester and Wrexham	W. F. J. SHEPHEARD.	Plymouth	J. DAVY TURNEY.
		Salisbury	S. R. ATKINS.
Chislehurst	J. G. PREBBLE.	Sheffield	G. T. W. NEWSHOLME.
Cork	T. R. LESTER.	Shrewsbury	W. G. CROSS.
Derby	S. TAYLOR.	Southampton	H. WILSON.
Doncaster	M. H. STILES.	Southport	J. RIGHTON.
Dublin	W. F. WELLS.	Spalding	E. WIGHTMAN BELL.
Dundee	WM. CUMMINGS.	Stockport	J. C. ARNFIELD.
Edinburgh	PETER BOA.	Sunderland	C. RANKEN.
Exeter	H. WIPPELL GADD.	Taunton	W. A. WRENN.
Glasgow	W. L. CURRIE.	Torquay	E. QUANT.
Godalming	J. H. MATHER.	Tunbridge Wells	A. E. HOBBS.
Harrogate	C. E. J. EYNON.	Warrington	J. RYMER YOUNG.
Hertford	G. S. DURRANT.	Wolverhampton	F. J. GIBSON.
Hitchin	F. RANSOM.	Worcester	C. W. TURNER.
Ilkley	G. W. WORFOLK.		
Ipswich	E. C. SAYER.		

The duties the Local Corresponding Secretaries have undertaken to discharge are briefly as follows:—

(*a*) To bring under the notice of pharmacists, principals, and their assistants, in their districts, who are unassociated with the Conference, the advantage of membership with it, and by personal effort to try and induce them to join.

(*b*) To assist in stimulating research by asking pharmacists, who have the time, ability, and disposition, to contribute from time to time a paper or useful note to the annual meetings.

(*c*) To endeavour to induce defaulters to continue their membership.

(*d*) To take generally a watchful and sympathetic interest in the affairs of the Conference.

To render those services voluntarily at times convenient to themselves and as opportunity offers.

THE

BRITISH PHARMACEUTICAL CONFERENCE.

AN ORGANIZATION ESTABLISHED IN 1863 FOR THE ENCOURAGEMENT OF PHARMACEUTICAL RESEARCH, AND THE PROMOTION OF FRIENDLY INTERCOURSE AND UNION AMONGST PHARMACISTS.

THE most important ways in which a member can aid the objects of the Conference are by introducing new members, suggesting subjects for investigation, working upon subjects suggested by himself or by others, contributing information tending to throw light on questions relating to adulterations and impurities, or collecting and forwarding specimens whose examination would afford similar information. Personal attendance at the yearly gatherings, or the mere payment of the annual subscription, will also greatly strengthen the hands of the executive.

A list of subjects suggested for research is published early in the year. Resulting papers are read at the annual meeting of the members; but new facts that are discovered during an investigation may be at once published by an author at a meeting of a scientific society, or in a scientific journal, or in any other way he may desire; in that case, he is expected to send a short report on the subject to the Conference.

The annual meeting for 1912 will be held at Edinburgh.

Gentlemen desiring to join the Conference can be nominated at any time on applying to the Secretaries, or any other officer or member. The yearly subscription is payable in advance, on January 1st. The amount, which includes free delivery of the Year-Book, is fixed at a minimum of 7*s.* 6*d.* for members residing within the Postal Union. Further information may be obtained from

THE ASST. SECRETARY, BRIT. PHARM. CONF.,
17, Bloomsbury Square, London, W.C.

THE YEAR-BOOK OF PHARMACY.

The Conference annually presents to members a volume of 400 to 500 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rule of the Conference, and a convenient form of nomination, will be found at page ii.

INTRODUCTION

In the retrospective history of pharmacy, the period covered by the *Year-Book*, **1911,** will doubtless be marked as that of the introduction of *Salvarsan.* Probably no modern therapeutic remedy, with the exception, perhaps, of tuberculin, has attracted such wide attention, or raised such hopes in the lay mind as this. The history of the discovery and introduction of the drug are typically illustrative of the trend of medicine, and of pharmacy in its wake, at the present time. Itself an organic compound of complex chemical structure, its application to the cure of syphilis has been the climax of years of patient scientific investigation, on what appeared, at first, to be totally different lines. When its undoubted power in destroying the *Spirochetes* was established, dioxy-diaminoarsenobenzene was introduced into therapeutics. At first it was known simply as Ehrlich-Hata's "606." The widespread notice and remarkable successes claimed for its use at once attracted attention to its commercial possibilities, and we now know it as a proprietary patented remedy under the trade name "Salvarsan," and it has since received the doubtful advantage of wide commercial advertisement. As pharmacists, we have nothing but a passing interest either in the permanence of the therapeutic effects of the drug, or in the ethical questions raised. We are only concerned with its pharmacy. In this connexion, but little of value had appeared in English literature until the publication by *W. H. Martindale* and *W. Wynn Wescott* of a monograph, "*Salvarsan or '606'; its Chemistry, Pharmacy and Therapeutics,*" from the pages of which, by the permission of the authors, we have made some abstracts.

In the domain of *Pharmaceutical Chemistry* there appears to be some cessation in the discovery of new *alkaloids.* This is partly due to the fact that therapeutists are at present directing their attention more to other sources; and that chemists are more concerned in investigating the molecular structure of those

bases which are already known, than in isolating fresh ones. The genesis, too, of these substances in plants, as illustrated by the work of *Kerbosch* on the *formation of alkaloids* in *Papaver somniferum*, indicates the growing connexion between chemistry and biology. Last year, attention was drawn to the existence of organic impurity in *Apomorphine hydrochloride*; *Boehringers* now demonstrate that this is β-chloromorphine, and give, with *Schneider*, tests for its detection. *Javillier*, and others, have found *silicotungstic acid* to be a useful alkaloidal precipitant, which has been successfully applied to the valuation of *belladonna preparations*, *nicotine products*, and other basic substances. *Schulze* traces the occurrence of *betaines* in a very large number of plants. *Monthulé* gives a useful method for the separation of *caffeine* and *theobromine*: *Goris* and *Fluteaux* direct attention to the *caffeine*-containing plants as a class; *K. Gorter* continues a long series of investigations on coffee and *caffeine*, and *C. Virchow* gives a method for the determination of the base in roasted coffee. Further details concerning *cheiroline*, the base of wallflower seeds, are furnished by *W. Schneider*. *Frerichs* makes a further contribution to the perennial question of the *alkaloidal valuation* of *tincture of cinchona*. The subject of the *alkaloidal valuation* of *coca leaves* is treated of by *Bierling Pape and Viehover*; *Goekel* gives the results of the examination of a large quantity of this drug; *Hankin* publishes some interesting notes on the *microchemistry of cocaine and of allied anæsthetics*; *Fuller* shows how it may be separated from strychnine, and calls attention to the important fact that the free base is distinctly volatile at below 100° C. *Nymann* and *Bjoerksten* recommend the use of *platinic chloride* as a cocaine precipitant.

Farr and Wright give a method for the determination of *colchicine* which is a distinct advance in the chemistry of that active and still important drug. *Corydalis root*, that rich source of alkaloids, has furnished *Gadamer* with a new base, corycavidine. *G. Denigés* has added a new reaction for *cupreine* and *morphine*, based on their phenolic attributes. *J. Troeger* and *H. Runne* summarize the present knowledge of the *alkaloids of cusparia*. *Yaga* has found a new base, *daphnimacrine*, in the Japanese *Daphniphyllum macropodum*. *E. Schmidt* replies to the negation of the existence of *scopolamine* in *Datura metel* by *de Plato* by repeated work, confirming his original statement as to its occurrence. *Gorter* has further examined the constitution of *dioscorine*. *Ergot alkaloids* continue to be the subject of

much controversy, and the veteran *Tanret* vigorously defends the position of *ergotinine* as the active principle of ergot, which has been attacked by *Barger* and *Carr*: *Wenzell* adds to the list of these active constituents by describing a "new" base, *ergoxantheine*. The influence of climate and soil on plant constituents in general, and on alkaloidal principles in particular, is well illustrated by the results obtained by *Brindejonc* with *Eschscholtzia californica* grown in Brittany; this plant contained but one alkaloid, *ionidine*, totally distinct from the basic constituents found in the plant grown elsewhere. *Gelsemium* has been investigated in this country by *C. W. Moore*, who attributes to *gelsemine* the formula $C_{20}H_{22}O_2N_2$, and enumerates other constituents; he has also investigated the constitution of the base; *Sayre*, in America, continues his investigation of the drug, giving $C_{14}H_{15}NO$ as the formula for gelsemine, and directing his attention to the *gelseminine* of Thompson. *W. H. Perkin*, junr. and *R. Robinson* have effected the synthesis of *gnoscopine*, a rare opium alkaloid. *J. Burmann* publishes a suggestive record showing how *medicinal plants* vary in their *alkaloidal constituents* in different years. *Ewins* has isolated a new base, *narcissine*, from the daffodil. The universal presence of *harmless ptomaines* in tinned fish and fish pastes demonstrated by *Desgrez and Caius* adds to the knowledge and responsibilities of toxicologists. *Koniewitz* contributes to the chemistry of the *sanguinaria alkaloids*. A new *strychnine*-containing plant, *Strychnos kipapa*, is found by *Vinci* to yield 5 per cent. of that alkaloid in its root-bark.

Animal products have not yielded much of interest; *Gaze* has, however, published a long investigation on the determination of *cantharidin* in galenical preparations of cantharides. *D. Hooper* gives an interesting account of the Indian *lizards* used in medicine; *H. G. Greenish* and *D. M. Braithwaite* have studied the life history of the warehouse pest, the drug beetle *Sitodrepa panicea*, and show how its chitinous particles may be detected in powdered drugs. Charabot and Hébert add to the analytical chemistry of *civet*; *Choay* gives an important series of articles on the preparation of *organic extracts*. *Pepsin* continues to exercise the minds of experimenters; the method of the new French Codex for its assay is criticized by *Portes*; *Mackay* points out the fallacy of combining it with alkaline medicines; while *Herrod* and *T. Maben* suggest an international standard test for it.

Attention of urologists is directed to an admirable compilation of references to the literature of the subject published by *G. Mellière*. *Jefimow* indicates what may prove to be a useful diagnostic urine-test for *tuberculosis*. Contributions to this subject, the importance of which is more fully recognized by French clinicians, than by English practitioners, are made by *Florence, Steensa, Denigès* and others.

Full activity had been maintained in the investigation of essential oils. The conjoint papers by *J. C. Umney* and *C. A. Hill* on the *Proposed Official Monographs on the Essential Oils*, published last year, have served the purpose for which they were written, by eliciting a volume of comment and suggestion, which has enabled the authors to review the question and has testified to the value of their work. The results embodied in the communication of *J. C. Umney and C. T. Bennett* to last year's Conference on *cinnamon bark oil* have received unanimous confirmation at the hands of English distillers of that oil; *Schimmels*, however, regard the results obtained here as due to the method of distillation employed, which is stated to entail the oxidation of the aldehydic constituents. Although this statement can be easily proved or disproved experimentally, so far no direct evidence has been offered on either side. *Bergamot oil* still maintains its unfortunate position of attracting the attention of the scientific adulterator, and chemists have to be constantly devising new tests to detect added esters; *Schimmels*, also *E. J. Parry*, publish useful notes on this. *R. C. Cowley* sends a welcome communication from Australia on *Australian cajuput oil*. *Evans* and others agree in condemning the *resorcinol test* for *cineol* in this and other oils, as being of doubtful value. *Cananga oil* has yielded *nerol* and *farnesol* to *Elze*, who has also found *nerol* and *thymol* in French *lavender oil*. *Yates* proposes to weigh, rather than measure, the "nonaldehydes" in the aldehydic valuation of *cassia oil*. *W. H. Martindale* has made a series of investigations on the *bactericidal power of essential oils*, in which the very high activity of some oils is proved; *H. Coupin* has investigated the toxicity of these oils on growing seedlings. *J. A. Brown* has devised an ingenious method for determining *essential oils in spices*. *E. J. Parry* reiterates the value of the determination of the *refractive index* as a factor in determining the quality of these oils. *Semmler* has shown *gingerol* and the new *perilla alcohol* to be identical. The *American nitroso-chloride test* of *Chace*, for

the presence of *pinene* in *lemon oil*, may be regarded as having received its quietus at the hands of a number of investigators: it will probably have been useful, however, in showing the care that is requisite in framing rigid official tests or standards, based on the results of a single analyst. A review of the relative merits of *English*, *French* and *Italian peppermint* is given by *J. C. Umney*, who replies to the reproach of French growers that the area under cultivation in England cannot possibly produce the amount of "English" peppermint oil sold, by a direct *tu quoque*, showing that the same occurs in France. *R. T. Baker* and *H. G. Smith*, having presumably exhausted the subject of eucalyptus oils, have now turned their attention to the *Australian pine oils*, some of which, in the enhanced value of oil of turpentine, promise to be of commercial importance. *Otto of rose*, as usual, is being adulterated with a new substance, as shown by *E. J. Parry*. Further data furnished concerning *sandalwood oil* indicate the desirability of extending the present too rigid physical characters of this oil. *Schimmels* have isolated new ketones and other constituents present in small quantities in this oil. *Elze* has found *geraniol* in *savin oil*, and states that *sabinyl acetate* is the chief constituent. He also finds *dihydrocuminol* and *phellandrene* to be present in *spearmint oil*. *Star-anise oil* has recently deviated markedly from accepted standards. This is noted and commented on by *Evans*, *Durrans*, *Parry* and *Schimmels*, while *Jensen* calls attention to the usefulness of the refractive index for valuing this oil. *Turpentine oil* being dear, is much adulterated; *F. H. Alcock* draws attention to a new sophistication therein. A posthumous note by the late *W. A. Wrenn* has appeared on *Lippia citriodora* oil. Many new and interesting essential oils are described by *Roure-Bertrand frères*, *Schimmels*, and others.

Many valuable papers have appeared on the important subject of the *oils* and *fats*. *Sasserath* states that much of the so-called *Moroccan olive oil* is derived from *Arganum sideroxylon* nuts. *Kesava Menon* gives some interesting details on Indian *Bassia oils*. A gross case of commercial misnaming has occurred in the export from India of so-called "*fixed oil of cardamoms*." This having been used for the manufacture of margarine, toxic symptoms followed; *Reinsch* has proved it to be allied to chaulmoogra oil. *David* has published a useful analytical process for the separation of liquid and solid *fatty acids*, as ammonium salts; *Winkler* suggests *propyl alcohol* as

the solvent for use in analytical *saponifications*. *Ghee* is treated of by *Kesava Menon* and by *E. R. Bolton*. *Schneider* makes a useful summary of the tests for that much tested and adulterated commodity, *lard*. Monographs for the *official oils*, *fats* and *waxes* have been suggested by *F. C. J. Bird* and *E. W. Lucas*, which have been commented on by *C. A. Hill*, *Evans*, *Cowie*, *Southalls* and others. *Wichmann* advises the use of a sterilizer, with heat under pressure, for the *quantitative saponification of waxes*.

Probably no branch of organic chemistry, in recent years, especially as regards natural drugs of therapeutic value, has witnessed more important advances than that which includes the *glucosides*. The full value of the results obtainable by the use of the biological method of research of *Bourquelot* are just beginning to be realized. Already the swing of the pendulum, in favour of vegetable drugs, prophesied some years back by *Tschirch*, shows evidence of having commenced. This has been largely brought about by the conscientious scientific work of Bourquelot and his pupils, and carried further by the brilliant school of French pharmacologists. The direct bearing upon pharmacy of much of this work, performed with familiar drugs, is evident. Not only so, it indicates that many of the lately despised popular remedies, hitherto regarded as being devoid of "active principles," may yet justify their popular reputation, since certain of them have already been proved to contain glucosides which are probably by no means devoid of pharmacological action. *Kobert*, too, who has made the *saponins* his special study, indicates that these bodies may account for the medicinal esteem of many popular drugs, such as sarsaparilla, which have been discarded by some therapeutists. *Brandl*, *Mayr* and *Vierling* have isolated a new glucoside from *Agrostemma githago*. *Bourquelot* and *Mme. Fichtenholz* have found pure *arbutin*, hitherto sought for in vain, in *pear* leaves. *Hérissey* and *Lebas* have detected *aucubin* in several species of *Garrya*. *Ketamura* has found a new glucoside, *camellin*, in *Camellia japonica* seed. *Kraft* has published an important investigation of the *digitalis glucosides*, and has isolated *gitalin*. This drug, which has been both the hope and despair of the pharmacologist, has also been the prey of the "ethical speciality" maker. *Bridel* has dealt with the amount of *gentiopicrin* in gentian at different periods, and, with his chief, demonstrates its occurrence in *Gentiana pneumanthe*. *Bridel* also shows that when

dried gentian is macerated in alcohol, 60 per cent., it may still undergo auto-hydrolysis; the full gentiopicrin content can only be obtained by first boiling the root in the alcohol, and thus killing the ferment. *Bourquelot* finds that thorough and rapid drying is sufficient to preserve the *glucosides* from hydrolysis in the majority of drugs; in some few instances a previous immersion in boiling alcohol may be necessary. *Bridel* finds *Menyanthes trifoliatia* to contain a glucoside *meliatin*. *Haycock* publishes a method for the valuation of *strophanthus seeds*, based on the hydrolysis of strophanthin. *Honey* is the subject of papers by *Bryan*, *Lenz*, *Fiehe Lund*, *Reinhardt* and others, whose work tends to show that the Continental commercial article is, at least, a mixture. *Bourquelot* and *Bridel* have found a new sugar, *verbascose*, in *mullein* leaves.

Among the *resins*, *oleoresins* and *balsams*, *copaiba* has received much attention from *Evans*, *Cocking* and others. *Tschirch* and *Kahan* have investigated a number of copals. The former pharmacognosist, with *Werdmuller*, has investigated *Honduras balsam*. *Scammony and its resin* have received attention from *Engelhardt and Schmidt*, *Evans*, *Guigues* and *Wiegel*. The last named gives some useful details concerning the determination of saponification value. *Vaubel* and *Puran Singh*, deal with *shellac* and its analysis. *J. C. Umney* draws attention to the deterioration of *storax* during recent years, in which he is borne out by *Southalls*.

In *inorganic chemistry* the ubiquitous *arsenium* has been found in notable quantity in the *algæ* by *Tassily* and *Leroide*. *Martindale* advocates the use of "rounded off" *atomic weights* for pharmaceutical work; *Woodhead* replies, with instances of the error involved in some cases with these. *Godfrin* gives methods for preparing *bismuth benzoates*. *Feist* gives a process for determining *hypophosphites* in pharmaceutical preparations. *Evans* direct attention to the presence of lead in commercial iodine. *Hallaway* deals with the determination of *mercuric iodide* in its ointment. *Lecco* warns toxicologists that *mercury and its salts*, in presence of organic matter, are very volatile in aqueous vapour. *Lithium* is indicated as being a constant constituent in all genuine *Vichy waters or salts* by *Mallat*. *Zinc dust* is shown by *Matignon* to be invariably contaminated with nitrogen, and *Lemaire* finds *sodium persulphate* often to contain ammonia; since these reagents are often used in organic chemistry, their purity should be ensured.

In general organic chemistry *Delehaye* shows how *formic acid* may be determined when present in acetic acid; and *Franzen and Egger* give a simple method for the determination of the former. *Rosenthaler* indicates a method for determining free *hydrocyanic acid* in presence of benzylcyanhydrin. *A. D. Waller* discusses its estimation in organic tissues, and *A. Jorissen* speculates as to its origin there. *Elvove* gives a useful modification of the U.S.P. titration method for *lactic acid*. *Moore* deals with the constitution of *a-elaterin*. *La Wall* contributes some new data to the *ash standards of drugs*. *Astruc* states that commercial *calcium glycerophosphate* is not the official mono-salt of the French Codex, but the impure di-glycerophosphate; he shows how the mono-salt may be prepared from this. *Nelson* gives a sensitive test to detect *capsicum* in beverages. *Linke* and *Stadelmayr* have discussed the testing of *chloroform*. *Tutin* publishes further work on *eriodictyol*, *homoeriodictyol* and *hesperitin*. *Baskerville* and *Hamor* deal exhaustively with the testing of *anæsthetic ether*. *Evans* find that "*butyric ether*" is often far from pure.

An investigation of considerable commercial and pharmaceutical importance has been instituted by *E. J. Parry* into the purity of *licorice stick* and *block juice*, the quality of some brands of which is notoriously unsatisfactory. Work on similar lines has been done by *Telle*, *Eriksson* and *Evans*. Doubtless the quality of this product will improve now that the much needed analytical attention has been directed to it. *E. Reeb* after many years, has re-investigated the toxic principle of *pyrethrum flowers*. He confirms the results of his original work. *C. A. Hill* has determined the degree of hydration of the large crystals which sometimes form in strong aqueous solution of *sodium salicylate*. These results are independently confirmed by *Evans*. *J. C. Umney* and *C. T. Bennett* have given standards for the *powdered spices* employed for *veterinary purposes*, which are frequently of too low grade quality. *Winton* and *Scott* publish official methods for distinguishing between genuine *vanilla essences* and their imitations. *Fleury* shows that true wine vinegar invariably contains *inositol*.

In the section devoted to *plant analysis* it will be seen that *Power* and his collaborators have published a number of very complete researches. With *C. W. Moore* he has examined *Bryonia dioica* root; with *Rogerson*, *Ipomœa*, *horsfalliæ* tubers and *Leptandra*; with *Salway*, *Iris versicolor* rhizome, and

Withania somnifera herb. *Tutin* has examined *Buphane disticha* and isolated four alkaloidal substances. *Leprince* has investigated the very poisonous *Adenium hongkel* and isolated a toxic principle. *Franzen* shows that the *leaves* of many plants yield an aldehyde, which he identifies as *α-β-hexalene aldehyde*. *Zellner* has submitted *Amanita muscaria* to a very complete analysis. *Masson* finds a saponoid among other constituents of *Asclepias vincetoxicum* root. *Goris* has isolated *kolatein*, a new phenolic constituent of *kola nuts*. *H. Finnemore* has found a new glucoside *prunitrin*, in a false wild cherry bark of undetermined botanical source. *Tschirch* and *Bromberger* find a number of interesting constituents in *Rhamnus catharticus* bark. *Tutin* and *Clewer*, investigating *Shensi rhubarb*, obtain a number of definite crystalline principles, but find the chief purgative to be a non-glucosidal resin.

The number of "new" remedies introduced shows but little sign of diminution, and none, generally speaking, of permanent value. There can be no doubt that a reaction is in process against the undue exploiting of familiar drugs under high sounding titles.

Pharmacognosy has been enriched by many useful papers. *R. C. Cowley* gives some interesting details with regard to *Queensland arrowroot*. *Mitlacher* records *Ailanthus glandulosa* as an adulterant of *belladonna*. *E. M. Holmes* is of opinion that *Siam* and *Sumatra benzoin* are obtained from different plants; *Rordorf* refers them to varieties of the same species. *E. M. Holmes* and *C. T. Bennett* give some interesting details with regard to *birch tar oil*, and the former deals with a new adulterant of *buchu*; also with *Cicuta virosa* as a cattle poison. *J. G. Sharp* and *Lancaster* discuss the time for gathering *digitalis* leaves, and the former has compiled a historical study of *ergot*. *P. E. F. Perrédès* again treats of cultivated *Grindelia camporum*. *Van Degen* has found *henbane seed* in Russian poppy seed. *Tunmann* advocates the process of *micro-sublimation* as a method for identifying many powdered drugs. *Schimmels* note the occurrence of *powdered orris* root adulterated with "extracted" root. *Kraemer* gives a full description of the rhizome of the true *Phlox ovata*, a spigelia substitute. *Gallois* finds that some of the histological elements in *commercial savin* powder attributed by *Collin* to the wood of *Juniperus phœnica* are really derived from the fruits of the true *J. sabina*. *Collin* deals with the microscopy of *saffron*, *pepper* and of many drugs.

In *Pharmacy*, many practical papers have appeared; in Great Britain, mainly from north of the Tweed. Probably our Scottish members are more favourably situated as to original work in dispensing than their southern fellow-craftsmen. In late years they have certainly published a larger proportion of useful notes. Many such also appear in the pages of contemporary American literature. *Lascoff* deals with the use of *acacia* in pharmacy; *T. Hart* gives an improved formula for *atropine* ointment. *G. Elliot* points out the *incompatibility* of *sodium bicarbonate* with *bismuth salicylate*; the *incompatibility* of *calomel* with *antipyrine* is dealt with by Wiedenkoff; and of its alleged decomposition by *sodium chloride* and organic matter by *Schaefer*, and *Federice*, by both of whom the formation of corrosive sublimate is denied. *Guyot* has a suggestive note on the microbian alteration of *collyria*. *W. Duncan* gives some actually occurring dispensing problems, and *H. Wyatt* has a similar series of practical formulæ. *T. Stephenson* rightly condemns the use of any but *fresh infusions* in the pharmacy. *Currie* gives the details for making *aseptic infusions*, concentrated for use in emergency. The *incompatibilities* of *liquid extract of licorice* are dealt with by *G. Elliot*, who also advocates the use of *quillaia* tincture to emulsify terebene. *Martindale*, in addition to the abstracts previously alluded to on *salvarsan*, gives some experiments of his own with the drug. *Macadie* attributes the change of colour in *adrenine solutions* mainly to the presence of free ammonia. *E. Gathercoal* shows how *belladonna* and *scopola extracts* may be distinguished microscopically. Cowley reverts to, and improves, his formula for *Liquor Bismuthi*. *Cherry laurel water* is the subject of investigation by *Myttenaere* and *Ribaut*. *Quant* deals with the interpretation of the word "digest" in the official instructions for making *liquid extract of ergot*. *Southalls* point out the great variability in strength of the green extracts. *Choay* shows that the only way to prepare fully active *organic extracts* is to dry them at a low temperature, *in vacuo*. *Cowley* advocates precipitation process for the preparation of *mercury oleate*, and gives a formula. *J. Mackay* also treats of the *metallic oleates*. *Boa* deals with the official *ointments* and suggests amendments. *W. S. Clark* gives a practical note on *syrup of squill* and advocates some form of standardization. *Tablet* making is dealt with by *Mosley* and also by *Dunnet*, while *Linhardt* deals with *tablet triturates*. *Dunlop* advocates the addition of wool fat to *paraffin*

ointment. *Stephan* treats of a new ointment basis, *Unguentum solubile.*

The section devoted to notes and formulæ contains many articles which cannot be well classified. They will probably be found of use for reference by the practising pharmacist.

In the present volume, as far as possible in the chemical section, and very generally in the other chapters, a reference has been given to any previous note on a given subject which appears in any *Year-Book* published since 1903. This, with the General Index, should give a fairly complete reference to *Year-Book* notes. It is hoped that this will lessen the trouble of those who may use the *Year-Book* and enhance its usefulness as a work of reference.

J. O. B.

YEAR-BOOK OF PHARMACY

CHEMISTRY

ALKALOIDS

Aconite Root, Varying Alkaloidal Value of. (*Evans' Analyt. Report*, **1910,** 6.) Two samples of autumn-gathered English root, assayed by the U.S.P. process, yielded 0·41 and 0·89 per cent. respectively of an alkaloid answering the physiological test for aconitine. (See also *Y.B.*, **1906,** 6 ; **1909,** 4 ; **1910,** 1.)

Alkaloidal Constituents of some Ranunculaceous Plants. O. Keller. (*Archiv. Pharm.*, 1910, **246,** 463, 468.) *Helleborus niger* rhizome, and probably that of *H. viridis* also, contains no alkaloid. The former yielded 0·045 per cent. of the glucoside helleborin. *Aquilegia vulgaris*, in all parts, is also free from alkaloid. *Caltha palustris* herb contains a small amount of a base ; but this is not identical with nicotine, as supposed by Johannsen. It is non-volatile, and forms a crystalline hydrochloride and plantinochloride. The flowers of *Delphinium consolida*, known as "*Flores calcatrippæ*" were stated by Masing to contain an alkaloid, calcatrippine. This the author has not been able to confirm. The seeds of this plant contain, however, three bases, one crystalline, and two amorphous. The crystalline alkaloid separates from EtOH in thick, almost six-sided tablets, m.p. 195–197°C., soluble in Et_2O. On recrystallizing, it is partly converted into an amorphous clear mass. It has yielded no crystalline salts. Of the amorphous alkaloids, one is readily soluble, the other is almost insoluble, in Et_2O. The crystalline base is not identical with Merck's pure crystalline delphinine. This is separable by crystallization from EtOH into six-sided thick tablets, m.p. 187·5°, and acute, aggregated needles, melting at a higher point than this, but not sharply.

Alkaloidal Hydrochlorides, Double Salts with $SbCl_5$. T. S. Thomsen. (*Oversigt. Kgl. Danske Viden. Selsk. Forhand,* **1911,** 41 ; *Chem. Zentralb.*, 1911, **1,** 1515.) Crystalline double hydrochlorides of $SbCl_5$ with the hydrochlorides of quinine, quinidine, cinchonidine, cinchonine, morphine, codeine, strychnine, cocaine, caffeine, and nicotine are described.

Alkaloidal Reactions with Perhydrol. E. Schaer. (*Archiv. Pharm.*, 1910, **248,** 463.) A reagent is freshly prepared with 1 vol. perhydrol and 10 vols. H_2SO_4. When cold, about 1 c.c. is added to 5 to 10 Mgm. of the alkaloid on a porcelain surface. Quinine and its salts give a bright lemon to canary yellow colour, which is changed to deep orange on adding a little $K_6Fe_2Cy_{12}$. The reaction is very sensitive, so that quinine may be used to detect perhydrol. Quinidine gives the same reaction. Cinchonine and cinchonidine give no colour. No reaction occurs with many alkaloids such as atropine, cocaine, conine, aconitine, and pilocarpine ; also with some glucosides and bitter principles, such as digitoxin, digitalin and santonin, or only such colours as are produced by sulphuric acid alone. A fugitive blood-red to cherry colour is obtained with veratrine, probably due to the H_2O present. Strychnine gives, with the addition of colloidal Pt solution, on standing for several hours, a faint purplish red reaction, which serves to confirm the well-known purple colour reaction obtained with the usual oxidizing agents and H_2SO_4. Brucine gives a bright reddish yellow. Morphine, codeine, narceine and papaverine give orange to purple red shades changing to brownish yellow and not lasting ; apomorphine gives a dark reddish brown. Berberine gives a cherry red, becoming brownish ; hydrastine bright chocolate red, especially after adding a little Bredig's solution ; emetine, dark orange red, much more distinct than the known fugitive yellow colour reaction. Nicotine gives a dark chocolate red, like that of hydrastine, but the latter alkaloid not being volatile, is easily distinguished. Caffeine and theobromine react best with a mixture of perhydrol in pure HCl, with the addition of a little Bredig's reagent. The alkaloid is evaporated to dryness on the water-bath with the reagents, when the pink residue gives purple reaction with AmOH.

Alkaloids, Distribution of, between immiscible Solvents, and its bearing on Assay Processes. A. Seidell. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1031.) Attention is directed to the fact that when a substance is removed from solution in one

liquid by shaking out with another immiscible solvent, there are many factors, which interfere with the complete extraction, which should not be overlooked in conducting alkaloidal assays; and that the difficulty of complete extraction increases with the dilution of the alkaloidal solution.

Alkaloids, Formation of, in Papaver somniferum. M. G. Kerbosch. (*Archiv. Pharm.*, 1910, **248**, 536.) The seeds contain only traces of narcotine, with some amorphous alkaloid. Three days after commencing growth narcotine is present in notable quantity; afterwards, codeine, morphine, papaverine, narceine, and thebaine appear. When the plants are 5 to 7 Cm. high, they contain narcotine, codeine, morphine, and papaverine. These four bases are found in all the organs, even in the stamens, of flowering plants. Papaverine disappears from the mature plant, only narcotine, codeine and morphine remaining. Seeds grown in N-free media still form narcotine, probably from their albuminoid contents.

Alkaloids of the Poppy and of Papaveraceous Plants, Increase of, by Fermentation. W. Heinrici. (*J.S.C.I.*, 1911, **30**, 649.) It is claimed that under the influence of various ferments such as yeast, diastase, pepsin and oxydases, and also of $KMnO_4$ and H_2O_2, the alkaloidal content of the expressed juices of papaveraceous plants is enormously increased. Thus in the case of the fresh "extracts" of *Papaver somniferum*, the total alkaloids rose from 1·8 and 2·5 per cent. up to 8·7 and 13·2 per cent. in 14 days, under the influence of these agents.

Apomorphine Hydrochloride, German, Nature of Impurity in Certain Brands. Boehringer and Sohn. (*Pharm. Zentralh.*, 1910, **51**, 73.) The impurity met with in certain brands of apomorphine hydrochloride is not, as supposed, trimorphine (*Y.B.*, **1910**, 4) but is β-chloromorphide, which is the direct opposite to apomorphine in its physiological action. The test given below will detect this impurity.

Apomorphine Hydrochloride, Tests for Impurities in. A. Schneider. (*Pharm. Zentralh.*, 1911, **52**, 537.) In addition to the test of Frerichs (*Y.B.*, **1910**, 5) the following test for the presence of the impurity β-chloromorphide is recommended for official recognition. Boehringers find that the greater part of the "trimorphine" of Frerichs and Harnach (*loc. cit.*) consists of this β-chloromorphide. About 0·1 Gm. of the salt,

dissolved in 10 c.c. of water, is treated in a separator with 20 c.c. of Et_2O and 5 c.c. of a cold-saturated solution of $NaHCO_3$, and shaken until the precipitate is dissolved. The aqueous layer is separated, and the Et_2O washed with 20, 20, and 20 c.c. of distilled water. The separated Et_2O solution is evaporated, and the cold residue dissolved in 5 c.c. of strong HNO_3 containing $AgNO_3$ 0·5 in 100, in solution. The solution is then heated for 10 minutes in the boiling water-bath. The clear brown liquid should then show practically no, or at the most only barely perceptible, clots of AgCl. Another impurity sometimes present in apomorphine hydrochloride is the polymerized amorphous salt. This can be easily detected by microscopical examination. (See also *Y.B.*, **1910,** 4.)

Atropine, Detection of, in Presence of Pilocarpine and of Eserine. J. Pohl. (*Therap. Monats.*, 1910, **12**; *P.J.*, 1911, [4], **32,** 297.) Alkaline solutions of the mixed alkaloids are shaken out with CS_2. Atropine alone is removed by this solvent. The residue, after evaporating the CS_2, affords the usual reactions for atropine if that base be present. The method is applicable to the separation of atropine from pilocarpine and eserine in collyria.

Belladonna Extracts, Determination of Alkaloids in as Silicotungstates. Javillier. (*Bull. Sci. Pharmacol.*, 1910, **17,** 629–634.) Provided a fair amount of alkaloid be present, the silicotungstic method affords a satisfactory means of determining the alkaloids of belladonna extract. The alkaloidal silicotungstate should be precipitated in the presence of about 2 per cent. of free HCl, a 10 per cent. solution of the reagent being added drop by drop to the acid solution, avoiding excess of the precipitant. After standing for 24 hours the precipitate is separated by filtration or in a centrifugal apparatus, washed with 1 per cent. hydrochloric acid, and incinerated. The weight, multiplied by 0·4064, gives the quantity of atropine, to which 0·0048 Gm. for each 100 c.c. of the original solution is added as a correction for the solubility of the atropine silicotungstate (the solubility in the wash water may be disregarded). Precipitation may be effected in hot or in cold solutions, but prolonged boiling must be avoided. Some commercial extracts gave, by this method, an atropine content as much as 55 per cent. lower than that obtained by the volumetric French official

method, but investigation showed that the figures obtained by the silicotungstate method were correct.

Betaines occurring in Plants. E. Schulze and Trier. (*Zeits. physiol. Chem.*, 1910, **67,** 46; *J. Pharm. Chim.*, 1910, **2,** 445.) These alkaloids are very widely distributed in plants; probably further investigation will reveal the presence of other bases of the same class, and throw light on their physiological significance. So far, ordinary betaine, trigonelline, and stachydrine are the only betaines which have been actually isolated; and these three have many properties in common. Ordinary betaine has been found in a large number of plants. Trigonelline, originally found by Jahns in fenugreek fruits, has also been isolated from peas, hemp seed, oats, carrot roots, tubercles of *Stachys*, coffee beans, haricot beans, and strophanthus seeds. Stachydrine has only been found as yet in *Stachys* tubercles and in orange leaves. Since these alkaloids are only found in plants at least six or nine weeks old, and in the ripe seeds, the authors consider that they are of the nature of excrementary products. They do not play any important part in the nutritive process, but are eliminatory products of the process of building up the protein molecule. (See *Y.B.*, **1910,** 7, 37.)

Caffeine and Theobromine, Quantitative Separation of. C. Monthulé. (*Annales Chim. Analyt.*, 1911, **16,** 137.) Twenty Cgm. of the mixed alkaloids is dissolved in a little AmOH and introduced into a graduated 100 c.c. flask. Twenty c.c. of N/10 $AgNO_3$ solution is then added. The precipitate formed is redissolved by adding more AmOH; the liquid is diluted to about 50 c.c. with water, a drop of phenolphthalein solution is added; the liquid is cautiously neutralized with acetic acid, avoiding excess, then made up to 100 c.c. and filtered. The amount of Ag is then determined in 50 c.c. of filtrate by the Charpentier-Volhard method (titration with N/10 AmCNS solution with iron alum indicator). If n = the number of c.c. of N/10 AmCNS used up, the weight of theobromine in 100 Gm. of the mixture $= 10 - n \times 16{\cdot}6$. Naturally the method is not applicable in presence of Cl, Br or I, or salts which precipitate $AgNO_3$. The caffeine may be obtained by evaporating the remaining portion of the filtrate, the volume of which has been noted, and extracting it with dry $CHCl_3$ in presence of NaCl.

Caffeine-containing Plants, Notes on. A. Goris and G. Fluteaux. (*Bull. Sci. pharm.*, 1910, **17,** 399.) From an exhaustive review of the chemical literature of the caffeine yielding plants, and as a result of their own researches, the following conclusions are come to. In all those plants in which caffeine occurs, it is found combined with substances having phenolic characters, tannides or tannosides. These tannoids do not give up their caffeine to $CHCl_3$; but if treated with water, they are dissociated, and then liberate their caffeine. According to the nature of these tannoids the caffeine plants may be divided into three groups. (1) Coffee, maté and possibly tea. (2) Kola and guarana. (3) Cacao. In coffee and maté the tannoid is a combination of chlorogenic acid with caffeine and K. Chlorogenic acid is a tannide giving, when split up, 2 mols. of quinic acid and 2 mols. of caffeic acid or 2 mols. of hemichlorogenic acid. In kola and guarana, caffeine is combined with kolatin or guaranatin, substances belonging to the catechin group (guaranatin is probably identical with catechin of catechu). Catechins are combinations of protocatechuic acid and phloroglucinol; so that guaranatin and kolatin have a structure similar to hemichlorogenic acid, being formed by the combination of two polyphenolic substances with complex functions. At present, it is not possible to state definitely the nature of the tannoid of kola or of guarana. It may be either composed of 2 mols. of kolatin-caffeine or of guaranatin, or may be a glucoside. The latter hypothesis, that the active principle is a glucoside, yielding caffeine on hydrolysis, does not yet appear to have been proved. Besides caffeine, the following bases are found: Choline in tea, maté, guarana, and cacao; betaine in kola; and trigonelline in coffee.

Caffeine, Determination of, in Roasted Coffee. C. Virchow. (*Chem. Zeit.*, 1910, **34,** 1037.) Ten Gm. of the finely ground coffee, 2·5 Gm. of magnesium oxide, and 10 Gm. of water are allowed to stand for 2 hours, and are then shaken with 100, 100, and 100 c.c. of $CHCl_3$ in succession, each shaking being continued for 1 minute. The $CHCl_3$ is treated with 1 Gm. of paraffin wax and distilled, the last of the $CHCl_3$ being blown off with a bellows; 25 c.c. of hot water is added to the residue in the flask, which is heated and shaken; when thoroughly melted it is poured into a beaker, the extraction of the flask-contents with hot water being repeated three times. The contents of the

beaker are heated and stirred until the fat and wax have melted to a clear liquid, then cooled and filtered, the filtrate evaporated and the residue (crude caffeine) weighed. To purify this, it is mixed with some MgO and evaporated to dryness on the water-bath, transferred with warm water to a porcelain dish. The finely powdered residue is then extracted three times with $CHCl_3$. The $CHCl_3$ solution is decanted through a small filter into a tared flask; the solvent and washings are distilled off, and the residue (practically pure caffeine) is weighed. The nitrogen-content of the residue is then determined. (See also *Y.B.*, **1907,** 28; **1910,** 7.)

Cheiroline of Wallflower Seeds. W. Schneider. (*Annalen*, 1910, **375,** 207.) Cheiroline, obtained from the seeds of *Cheiranthus cheiri*, is a mustard oil, γ-thiocarbiminopropylmethylsulphone, $CH_3{\cdot}SO_2{\cdot}CH_2{\cdot}CH_2{\cdot}CH_2{\cdot}N:C:S$. The seeds are first extracted with Et_2O in a Soxhlet apparatus to remove fatty oil present to the extent of 25 per cent. Afterwards they are shaken with ether and 5 per cent. sodium hydroxide solution, and the ethereal extract concentrated, when a residue of crude cheiroline with some oil is obtained. The latter is separated by shaking out the residue with 0·5 per cent. H_2SO_4 at 50°–60°C. On saturating the acid solution with Am_2SO_4 and shaking out with Et_2O, the cheiroline is dissolved. The Et_2O solution is dried over anhydrous K_2CO_3, and leaves on evaporation about 1·6 to 1·7 per cent. of pure cheiroline. The seeds of *Erysimum arkansanum* yield about 1·3 per cent. by the same method. Cheiroline crystallizes from Et_2O or MeOH in fine, colourless, odourless prisms, m.p. 47°–48°C., and distils at 200°C., at 3 mm. without decomposition. When hydrolysed with NaOH it decomposes quantitatively into hydrogen sulphide, carbon dioxide, and γ-aminopropylmethylsulphone, $CH_3{\cdot}SO_2{\cdot}(CH_2)_3{\cdot}NH_2$. This hygroscopic base, m.p. 44°C., is easily soluble in water, giving a strongly alkaline solution. The hydrochloride melts at 146°C. (See also *Y.B.*, **1908,** 43.)

Cinchona Leaves, Alkaloid Content of. P. van Leersum. (*Koninkl. Akad van Wetensch. Chem. Zentralb.*, 1910, **2,** 666.) The total alkaloids present in normal living leaves of *Cinchona succirubra* and *C. ledgeriana*; fallen leaves; and leaves kept for a long time in the dark have been determined. The fallen leaves and the leaves protected from light invariably contained more alka-

loids than normal living leaves; hence the alkaloids must not be regarded as assimilation products, but as excretory products formed in the leaves or other organs. No transference of alkaloids from the leaves to the stem of the plant takes place.

Cinchona Tincture, Alkaloidal Valuation of. H. Frerichs. (*Apoth. Zeit.*, 1910, **25,** 836.) For the determination of the total alkaloids in cinchona bark Fromme's method is considered to be best: 2·5 Gm. of the powdered bark is placed in a 200 c.c. flask with 20 c.c. of water and 2 c.c. of 25 per cent. HCl, and heated in a boiling water-bath for ten minutes. After cooling, 25 Gm. of $CHCl_3$ and 50 Gm. of Et_2O are added, then 5 c.c. of 15 per cent. NaOH solution, with vigorous shaking. The mixture is shaken for ten minutes, 1·5 Gm. of powdered tragacanth are added, and the whole again well shaken until the ethereal layer is clear. Sixty Gm. of the Et_2O layer (representing 2 Gm. of the bark) is strained into a separator, and the alkaloids extracted by shaking out with three successive quantities of 1 per cent. HCl. The bulked acid solutions are made alkaline with AmOH and shaken out with three successive quantities of $CHCl_3$. The mixed $CHCl_3$ solutions are filtered and evaporated to dryness. The residue is dried at 100°C. until constant. Percolation is found to yield a tincture of higher alkaloidal value than either single or double maceration. Titration of the residue immediately after evaporation of the ether-chloroform solution gave results which agreed with the gravimetric figures, but on prolonged drying it afforded lower results. This is attributed to partial decomposition of the bases by heat. Direct titration with hæmatoxylin indicator is the method preferred. The author supposes that during the heating at 100° some decomposition of the alkaloids takes place. The titrations may be made directly using hæmatoxylin as indicator, or indirectly, with methyl-red as indicator, the former method being preferred by the author.

Coca Leaves, Alkaloidal Assay of. E. Bierling, K. Pape and A. Viehoever. (*Archiv. Pharm.*, 1910, **248,** 303.) Ten Gm. of the powdered leaves, the moisture of which has been determined in a separate weighing, is thoroughly mixed with 4 or 5 c.c. of strong solution of AmOH and extracted with Et_2O for 4 or 5 hours in a Soxhlet, or until the Et_2O residue gives no precipitate with Mayer's reagent. The ether extract

is then shaken out with 30, 10, and 10 c.c. of HCl 1 : 50. The bulked acid liquid is made alkaline with AmOH and shaken out with 40, 20 and 20 c.c. of Et_2O. The Et_2O is then distilled off in a tared flask and the residue is twice redissolved in 5 c.c. of Et_2O and evaporated, then dried at 100°C. to constancy. The amount of alkaloid may be verified by redissolving the residue in a known volume of N/10 or N/100 HCl and titrating back with iodeosin indicator. Or the alkaloids may be titrated directly in alcoholic solution with the above acid, using methyl red indicator. (See also *Y.B.*, **1906,** 26, and *Gen. Index.*)

Coca Leaves, Results of Sixty Assays. H. J. Goekel. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1051.) From experience with a large number of samples the author concludes that the U.S.P. requirements are too low. Only two samples of leaves have been met with assaying less than 0·612 per cent. of Et_2O soluble alkaloids; one, an *Erythroxylon coca*, gave 0·558, and another, *E. truxillense*, 0·0582 per cent. Thirty lots of *Erythroxylon coca*, probably Huanuco leaves, representing 1,500 bales, ranged from 0·558 to 0·852 per cent. Five lots designated Huanuco leaves, representing 216 bales, gave 0·942 to 0·816 per cent. Five lots of Cuzco leaves, from 348 bales, ranged from 0·894 to 0·714 per cent. One lot of 87 bales of Maxillo leaves yielded 0·810 per cent.; and another 42 bales of Amazon leaves 0·75 per cent. Over 800 bales of Truxillo leaves ranged from 1·11 to 0·582 per cent. These analyses were made by the following method. Twenty Gm. of well-ground coca leaves are agitated for 1 hour in a mechanical shaker with kerosene 200 c.c. and a few c.c. of dilute AmOH. Then extract in percolator to 500 c.c. with kerosene. The percolate is then extracted with four portions of HCl (15 to 200 H_2O). The acid liquor is washed with three portions of Et_2O, then made alkaline with a slight excess of AmOH extract with Et_2O 20 c.c., 15 c.c., and 15 c.c., and evaporated at 65–70°C. in a tared beaker. Dissolve the alkaloids in Et_2O, add a slight excess of N/10 H_2SO_4, the amount of N/10 H_2SO_4 required is estimated by dividing the weight by 0·03. Evaporate off the Et_2O, add 3 drops of cochineal indicator, titrate excess of N/10 H_2SO_4 with N/10 NaOH, multiply the difference between the acid and the alkali by 0·03 to get the weight of the alkaloid calculated as cocaine.

Cocaine and Allied Anæsthetics, Microchemical Reactions

for. E. H. Hankin. (*Analyst*, 1911, **36**, 2.) A film of $KMnO_4$ is obtained by evaporating one drop of a strong solution on a glass slide. On adding to this a small drop of *cocaine* solution in a semi-saturated solution of alum, cocaine permangate crystals, in nearly square, pink plates, form in about 2 minutes. In the case of cocaine lactate the alkaloid should be liberated with AmOH, and shaken out with Et_2O. The Et_2O is then shaken out with the alum solution and tested as above. *Alypin* in aqueous solution similarly treated with $KMnO_4$ gives light pink crystals in dendritic irregular bunches of needles and plates. If dissolved in KBr, alypin forms isolated plates and rosettes. Cocaine does not usually give crystals from KBr solutions. Alypin does not easily form crystals from alum solutions. *Tropacocaine* forms dark red crystals with $KMnO_4$ more easily than any other cocaine substitute. They usually have curved edges; are often oblong. From alum solution feathery groups are deposited. *Scopolamine* crystallizes with difficulty with $KMnO_4$, the dark red crystals being very variable in form. Dilute solutions only give oily drops or an amorphous precipitate. *Beta-eucaine*, *stovaine*, *holocaine*, and *nirvanine* give no crystals with $KMnO_4$.

Cocaine, Determination of, in Solutions, as Platinochloride. M. Nymann and R. Bjoerksten. (*Pharm. Zentralh.*, 1911, **52**, 71.) Cocaine may be precipitated quantitatively as $(C_{17}H_{21}NO_4 \cdot HCl)_2PtCl_4$ (mol. weight = 1016). The method is convenient for the valuation of pharmaceutical solutions such as injections. A known volume of the solution is treated with 3 c.c. of HCl, sp.gr. 1·125, and a slight excess of $PtCl_4$ reagent, and then with 3 volumes of alcohol. The precipitate formed is collected on a tared filter, dried and weighed, the volume and alcoholic strength of the filtrate being known. A correction for the solubility of the double salt in the menstruum is then made, from the following data. Solubility in alcohol 50 per cent., 0·03 : 100; in alcohol 70 per cent., 0·022 : 100; in absolute alcohol, 0·012 : 100; in water, 0·044 : 100. The presence of boric acid does not affect the result. The method is, of course, not applicable in presence of atropine or of other alkaloids.

Cocaine, Loss of, at 100°C. H. C. Fuller. (*J. Ind. Eng. Chem.*, 1910, **3**, 426.) Cocaine alkaloid is distinctly volatile at 100°C., but not below 90°C. Consequently when determining

the base the evaporation residue should not be dried at a temperature above the latter figure. The final drying to constant weight should be done over H_2SO_4 at the normal temperature.

Colchicine, Toxicological Detection of. H. Fuehner. (*Arch. exp. Pathol. u. Pharmakol.*, 1910, **63,** 357; *Apoth. Zeit.*, 1910, **25,** 826.) About 3 to 5 c.c. of the liquid to be tested is treated with 5 drops of 15 to 20 per cent. HCl and heated for half an hour in the boiling water-bath. From 3 to 5 drops of Fe_2Cl_6 solution is then added, until the green colour produced no longer deepens. The cooled liquid is then shaken out with one-third to one-fourth of its volume of $CHCl_3$. On separating, this is coloured either yellowish or pomegranate-red, according to the amount of colchicine present. If the coloured liquids are too opaque, the mixture must be further diluted with water. In very dilute solutions, the red colour passes to yellow, and then to brown. The red tint will not be obtained with less than 0·002 to 0·005 Gm. of colchicine. The green colour is more sensitive, but alone, it is not sufficiently characteristic.

Colchicum Seeds, Critical Note on Processes for the Determination of Alkaloids in. E. H. Farr and R. Wright. (*Pharm. J.*, 1911, [4], **31,** 578.) After dealing with the general principles affecting the isolation of colchicum alkaloids, and criticizing in detail the methods of Blau (*Y.B.*, **1904,** 66); Bredemann (*ibid.* 67); Panchard (*Y.B.*, **1907,** 35) and the U.S.P. method, the authors have devised the following process, which they claim to give colchicine in a cleaner condition than any of the above, and also more pure than that obtained by a modified form of the U.S.P. method. Pack 5 Gm. of the drug in No. 30 powder in a glass tube suitable for percolation, and about 2 Cm. in diameter, and exhaust by slow percolation with 50 per cent. EtOH. Transfer the percolate to a porcelain dish, add 25 c.c. distilled water, and evaporate over a water-bath till the volume is reduced to about 20 c.c. Pour, while yet warm, into a separator, rinsing the dish, first with a little water, and then with 25 c.c. petroleum ether, add the rinsings to the contents of the separator, shake vigorously. Set aside till the liquids have separated, run off the whole of the lower layer and pour away and reject the clear upper layer. Return the residual liquid to the separator, repeat the agitation and separation twice with

20 c.c. petroleum ether. Saturate the aqueous liquid in the separator with NaCl and shake vigorously for a minute with 20 c.c. of $CHCl_3$, set aside till separation is complete, draw off the $CHCl_3$ into a flask. Twice repeat the agitation with 10 c.c. of $CHCl_3$ and the separation. If necessary, shake again with successive quantities of 5 c.c. of $CHCl_3$ as long as any alkaloid is extracted. Recover the $CHCl_3$ from the mixed solutions, and treat the residue, first with a mixture of 19 c.c. distilled water and 1 c.c. solution of AmOH used in four portions, and then with a mixture of 16 c.c. of water and 4 c.c. of diluted H_2SO_4. Run these solutions through cotton wool into a second flask, shake, add 20 c.c. of TS iodine, set aside for five minutes, transfer the liquid containing the precipitate carefully, in portions, to a filter paper about 7 cm. in diameter. Rinse the empty flask with 20 c.c. distilled water containing 1 c.c. each TS iodine and diluted H_2SO_4, pouring the rinsings over the precipitate on the filter. Allow the latter to drain, place the filter paper containing the precipitate in a small mortar provided with a good lip, rub thoroughly with 20 c.c. TS sodium thiosulphate, to which 2 c.c. TS Na_2CO_3 has been added, until the paper has been reduced to a uniform pulp. Transfer the mixture carefully to a glass funnel about 10 cm. in diameter, the neck of which has been plugged with moistened cotton wool, and collect the filtrate in a separator. Rinse the mortar carefully with several small portions of distilled water, pouring the rinsings over the contents of the funnel until a few drops of the filtrate, acidified with diluted H_2SO_4, fail to give a precipitate with a few drops of TS iodine. Shake the liquid in the separator vigorously for a minute with 20 c.c. of $CHCl_3$, set aside till separation has taken place, draw off the $CHCl_3$ into a tared platinum dish, repeat the process twice with 10 c.c. of $CHCl_3$ and subsequently, if necessary, with successive quantities of 5 c.c. of $CHCl_3$ so long as any alkaloid is extracted. Evaporate the mixed $CHCl_3$ solutions to dryness at a low temperature; dissolve the alkaloids in a little 90 per cent. EtOH; evaporate over a water-bath; and dry the residue at 100°C. until constant; weigh. The weight of the alkaloid should be not less than 0·025 Gm., equivalent to not less than 0·5 per cent. in the seeds.

The above processes were tried on two samples of the seeds in No. 30 powder, with the following results (expressed in percentages) :—

	1.	2.
1. Bredemann	0·55	0·84
2. Blau	0·60	0·78
3. Panchard	0·50	0·62
4. U.S.P.	spoilt	0·83
5. F. and W.	0·54	0·79

Some of the alkaloids obtained from the first four of the above-mentioned processes were purified by dissolving in water rendered slightly acid with diluted H_2SO_4, precipitating with an excess of TS iodine, the alkaloid being subsequently recovered as in (5) and the weight recorded. A few of the results are appended :—

No.	Process.	Crude Alkaloids.	Pure Alkaloids.
1	Panchard	0·054	0·051
2	Ditto	0·036	0·035
3	U.S.P.	0·037	0·018
4	Ditto	0·042	0·036
5	Ditto	0·035	0·025
6	Bredemann	0·084	0·045
7	U.S.P. (modified)	0·046	0·036
8	Ditto	0·033	0·028
9	Not recorded	0·088	0·078
10	Ditto	0·084	0·075
11	Ditto	0·032	0·026
12	Ditto	0·030	0·022

These results prove conclusively that the alkaloids obtained by the assay processes in common use contain impurities which can be removed by subsequent treatment with iodine and thiosulphate. It was also established that of the processes tried the two which involved their direct precipitation from solution gave the purest product.

The official method of the U.S.P. was modified thus :—To 10 Gm. of the finely powdered seeds add 100 c.c. of a mixture of 77 volumes of Et_2O, 25 volumes of $CHCl_3$, 8 volumes of absolute EtOH, and 3 volumes of solution of AmOH, and shake the mixture frequently during 12 hours. Filter 50 c.c. through a plug of wool into a small flask, and distil off the solvent. Dissolve the residue in 10 c.c. of Et_2O, add 5 c.c. of water and 1 Gm. of hard paraffin. Distil off the Et_2O, shake the residue in the flask and heat it on a water-bath until the paraffin has separated into a well-defined layer ; cool, break the cake of wax with a platinum wire, and filter the aqueous solution into a separating

funnel. Shake this aqueous liquid, first with 15 c.c. of $CHCl_3$ and afterwards with successive portions of 10 c.c. until exhausted. Distil the united $CHCl_3$ solutions to dryness in a tared flask, add 5 c.c. of water, dissolve on a water-bath, boil gently for 2 or 3 minutes, dry at 100° and weigh. The weight should be not less than 0·025 Gm., equivalent to 0·5 per cent. of colchicine in the seeds. This method gives results slightly higher than those of the authors' process.

Corycavidine, a New Corydalis Alkaloid. J. Gadamer. (*Archiv. Pharm.*, 1911, **249,** 30, 224.) The new base, corycavidine, $C_{22}H_{25}NO_5$, m.p. 212–213°C.; $[a]_D + 203{\cdot}1$ in $CHCl_3$, has been isolated from the alcohol-soluble portion of the mixed sulphocyanides of the so-called amorphous alkaloids of *Corydalis cava*. The EtOH solution was rendered alkaline with a slight excess of alcoholic AmOH and shaken out with Et_2O and water. The Et_2O was distilled off and the residue converted into hydrochlorides. Corycavidine was isolated from these by fractional liberation with AmOH and shaking out with Et_2O. It crystallizes from $CHCl_3$ with one mol. of that solvent. It contains two methoxyl and one N-methyl groups. It is converted into an optically inactive base by heating to 193–195°C. In addition to the above, protopine, glaucine, and bulbocapnine have also been isolated from the so-called amorphous bases. The pseudocorycavine of Gaebel is found to be a mixture in equimolecular proportions, of corycavine and corycavidine. (See *Y.B.*, **1905,** 69; **1910,** 19.)

Cupreine, New Reaction for. G. Denigès. (*Comptes rend.*, 1910, **151,** 1354.) If 1 c.c. of AmOH solution be added to 10 c.c. of a 0·2 : 100 solution of cupreine sulphate, then 1 c.c. of 1 vol. H_2O_2 solution, and lastly 0·1 c.c. of 3 or 4 : 100 solution of $CuSO_4$, $5H_2O$, a fine green colour is formed. This deepens and a bluish green turbidity appears, which is redissolved by adding alcohol, or a little acid, giving a clear intense emerald green solution. The suspended matter may be separated, when it gives the characteristically coloured solutions on re-solution. Solid cupreine salts and alkaloidal residues may be tested by moistening them first with the following reagent, $CuSO_4.5H_2O$ solution 3 to 4 : 100, 1 c.c.; AmOH, 5 c.c.; H_2O, 10 c.c.; then adding 1 c.c. of H_2O_2 not exceeding 0·5 vol. in strength. The green colour is discharged by a large excess of H_2SO_4, becoming

reddish yellow. The reaction is due to the phenolic function of cupreine, and is very sensitive.

Curarine, Preparation of. R. Boehm. (*Archiv. der Physiol.*, **136,** 203.) From 15–25 Gm. of calabash curare is macerated for 8 days with 25 times its weight of EtOH, 70 per cent., then filtered. The filtrate is treated with 15 parts of absolute EtOH, and again filtered ; the filtrate is distilled, and the residue evaporated to dryness on the water-bath. This dry residue is taken up with water, filtered and precipitated with a 1 : 10 solution of $PtCl_4$. The precipitate is drained, freed from water, washed with EtOH, and finally suspended in 20 to 25 c.c. of EtOH. This suspension is then heated on the boiling water-bath for 10 to 15 minutes with alcoholic AmOH to distinct alkaline reaction. The yellow alkaloidal solution is filtered and the precipitate is washed with a little hot absolute EtOH. Curarine chloride is precipitated from the EtOH solution as a light yellow powder, by adding Et_2O, while curine remains in solution. The precipitate is quickly collected and dried *in vacuo* over H_2SO_4. It is purified by re-solution in a mixture of $CHCl_3$ 9 parts, absolute EtOH 1 part, filtering and evaporating to dryness in the air. Curarine chloride thus obtained forms reddish brown brittle scales readily soluble in water, EtOH, and a mixture of EtOH and $CHCl_3$.

Cusparia Alkaloids. J. Troeger and H. Runne. (*Apoth. Zeit.*, 1910, **25,** 957, 969, 977, 988.) A complete review of the previous work on the bases present in Angostura bark, with a re-investigation of their chemical formulæ and the isolation of a new alkaloid. The following are the bases definitely isolated in a crystalline form. Cusparine, $C_{20}H_{19}NO_3$, m.p. 89–90°C. ; galipine, $C_{20}H_{21}NO_3$, m.p. 115–115·5°C. ; cusparidine, $C_{19}H_{17}NO_3$, m.p. 79°C. ; galipidine, $C_{19}H_{19}NO_3$, m.p. 111°C. ; a new alkaloid angosturine, $C_{19}H_{15}NO_4$, m.p. 231°C. ; and cuspareine, $C_{18}H_{19}NO_2$, m.p. 56°C. Angosturine occurs in fine, white, light, anhydrous needles. The platinochloride $(C_{19}H_{15}NO_4)_2H_2PtCl_4 + 2H_2O$? crystallizes from alcoholic HCl in broad yellow prisms which decompose with charring at 158°C. (See also *Y.B.*, **1904,** 72 ; **1906,** 29 ; and *General Index.*)

Cusparia Alkaloids, Further Investigation of. J. Troeger and H. Runne. (*Archiv. Pharm.*, 1911, **249,** 174.)

Angosturine, $C_{19}H_{15}NO_4$, m.p. 233°F., is now named galipoidine. Its Pt salt contains 2·5 mols. and the abnormal Au salt 1·5 mols. of water of crystallization. Cusparine, $C_{20}H_{19}O_3N$, is dimorphous. It crystallizes from a mixture of Et_2O and petroleum ether in fine, white, stellate needles, m.p. 91°C., and in heavy amber-coloured crystals, m.p. 122°C., after sintering at 110°. Its Pt salt contains 3 mols. of water ; when crystallized from alcoholic HCl it forms yellow needles, m.p. 197°C., and in broad long prisms, m.p. 210°C. The amino-base and derivatives are described. (See also *Y.B.*, **1906,** 29.)

Daphniphyllum Macropodum, Alkaloid in. S. Yaga. (*Archiv. Pharm. Therap.*, 1910, **20,** 117 ; *Pharm. Zentralh.*, 1910, **51,** 761.) This Euphorbiaceous Japanese plant contains an alkaloid, daphnimacrine, $C_{27}H_{41}NO_4$. It is a paralysant poison, arresting the movements of the heart and lungs.

Datura Metel, Alkaloids of. E. Schmidt. (*Archiv. Pharm.*, 1910, **248,** 641.) In 1905 the author (*Y.B.*, **1905,** 115) found *Datura metel* to be a typical scopolamine producing plant, and recommended it as a source of that base, and Kercher confirmed its presence in the seeds. Recently G. de Plato (*Staz. sperim agar. ital.*, **43,** 79) has stated that these seeds contain no alkaloids, nor any cyanogenetic glucoside, but yield allantoin. The author has therefore repeated his experiments, employing the seeds of *Datura metel*, grown in Marburg botanical garden. He confirms his previous statement, that the seeds contain alkaloids, chiefly scopolamine, with a little hyoscyamine.

Dioscorine. K. Gorter. (*Chem. Zentralh.*, 1910, **2,** 1228.) The author has further examined the base, originally isolated by Boorsma (*Y.B.*, **1898,** 62) from the tubers of *Dioscorea hirsuta*. The alkaloid was obtained by extraction with EtOH 96 per cent., made faintly acid with acetic acid. When pure, it distils *in vacuo* unchanged. It is a tertiary base, and contains no HO groups, and behaves like a γ-lactone with dilute KOH. When fused with KOH it gives methylamine and a phenol. It reduces $KMnO_4$.

Duboisia hopwoodii, Pituri, Alkaloid of. E. Senft. (*Apoth. Zeit.*, 1911, **26,** 128.) The narcotic and stimulant effects of pituri are due to the volatile liquid alkaloid, piturine. The odour

of this is peculiar, and somewhat resembles that of conine. It is distinct, however, from that base, and from nicotine. The leaves are smoked by the Australian natives as tobacco.

Ergot, Active Constituents of, and the Assay of Ergot Preparations. A. Kazay. (*Zeitsch. Allgem. osterr. Apoth. Verein.*, 1910, **51**, 547.) According to Tanret, Kobert, and Keller, the chief active constituent of ergot is the white crystalline substance ergotinine, $C_{35}H_{40}N_4O_6$. For the detection of this substance the Hungarian Pharmacopœia adopts Keller's test, which is as follows: The substance is dissolved in concentrated acetic acid containing a little ferric chloride, and concentrated sulphuric acid is poured on. A violet-blue layer is formed at the surface of separation of the two liquids. Ergotinine is an unstable substance, and in presence of moderately concentrated acids changes into cornutine, an amorphous water-soluble body, which gives a red iridescent layer by Keller's test. The author was unable to get anything but the red colour of cornutine by Keller's test when using commercial preparations of ergot which had been exposed for some time to a high temperature in the process of manufacture. In order to investigate the relationship of cornutine to ergotinine the author prepared an extract by Keller's process. The coloured layers obtained by the above test were examined spectroscopically. With cornutine, an absorption band in the blue portion of the spectrum is obtained, and this was readily observed when testing commercial extracts. The preparation made by Keller's method gave a violet-red layer, and showed an absorption band in the yellow near the D line, which, however, quickly disappeared, to be replaced by the line characteristic of cornutine. Ergotinine thus appears to be absent from most commercial extracts. The parahydroxyphenylethylamine of Barger and Dale is probably a decomposition product of ergotinine or of proteid matter. Several other active constituents of ergot have been described, but none gives any characteristic reaction which might be used to detect the presence of ergot. For this purpose, the presence of the colouring matter sclererythrin must be proved by a spectroscopic examination. For the assay of ergot preparations the author recommends extraction with ether after treatment with alkali and determination of the nitrogen in the residue from the ethereal extract by a modification of Kjeldahl's method.

Ergotinine, Crystalline. C. Tanret. (*Bull. Sci. pharm.*,

1911, **18,** 20.) The author reiterates the statement that his crystalline ergotinine is an active principle of ergot. He attributes the failure of Barger and Carr to obtain physiological reaction, in the sole experiment they record, to the fact that they employed a solution from which the active principle was precipitated in an insoluble, and therefore inactive form, on the addition of water. A number of independent pharmacological experiments are then quoted to support the case of its great activity in doses of $\frac{1}{4}$ to 1 milligramme. (See also *Y.B.*, **1910,** 20, 21, 30.)

Ergoxantheine, a New Active Constituent of Ergot. W. T. Wenzell. (*Amer. J. Pharm.*, 1910, **82,** 410.) Liquid extract of ergot (Squibb's), 25; is mixed with alcohol 95 per cent., 75; and filtered after standing for 12 hours. The alcohol is then driven off by evaporation at 30°C. The residue is made up to 50 with water, filtered, and the insoluble matter washed with more water until the total filtrate is 100. This is then shaken out with $CHCl_3$; after separating the lower layer, the aqueous portion is shaken out with Et_2O. On evaporating the Et_2O extract, ergoxantheine is obtained as an orange yellow, amorphous residue, in a yield of about 0·25 per cent. Soluble in EtOH, Et_2O, C_6H_6, acetic ether, amyl alcohol, acetone and CS_2. Insoluble in water, $CHCl_3$, and CCl_4. It gives a dark orange colour with HNO_3. It is precipitated by basic lead acetate, and by phosphotungstic acid, from solutions in EtOH. Its solutions become blood red in presence of excess of AmOH. This coloured solution has a characteristic absorption spectrum.

Eschscholtzia californica, cultivated in Brittany, Alkaloid from. G. Brindejonc. (*Bull. Soc. Chim.*, 1911, **9,** 97.) The examination of the root of the *Eschscholtzia* cultivated in Brittany has given results quite different to those recorded as being obtained from plants grown in other localities. It only contained one alkaloid to the extent of about 0·25 per cent. It was obtained from the alcoholic extract of the dried root, first purified by lead acetate, by shaking out with ether. When purified by recrystallization, it forms short flattened prisms; m.p. 154–156°; sparingly soluble in Et_2O; readily dissolved by $CHCl_3$. Its empirical formula is $C_{19}H_{25}N_4O_4$; it has been named ionidine, on account of the fine violet colour it gives with H_2SO_4, containing a trace of nitrous compounds and with Froehde's reagent. Pure H_2SO_4 gives no colour. The violet colour is proportional,

up to a certain point, with the amount of nitro-impurity present. With excess, a yellow colour is formed, and with a large excess, green. Ionidine appears to be a weak narcotic, devoid of toxicity. This is a notable instance of the profound difference soil and climate may effect in the constituents of plants. (See also *General Index*.)

Gelsemium Alkaloids, Gelseminine, and other Constituents of. L. E. Sayre. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 949.) The so-called "gelseminine" of Thompson, obtained as an amorphous substance after separating gelsemine hydrochloride by crystallizing from alcohol, has been separated into two distinct bodies having different melting-points and solubilities. It is possible that true gelseminine will prove to be a coloured alkaloid producing coloured salts. Crude gelseminine has been stated to be at least ten times more toxic than gelsemine. When treated with AmOH a part of the crude gelseminine is dissolved; this soluble portion is also basic, and has been provisionally named gelsemoidine. It is less powerful as a heart depressant than gelsemine. Gelsemine hydrochloride, contrary to statements formerly published, has an inherent power as a heart depressant, preceded by a period of excitation. The alkaloid gelseminine, insoluble in ammonia, is less toxic than any other of the gelsemium bases. The formula for gelsemine is now given as being $C_{14}H_{15}NO$. For the rapid assay of gelsemium preparations a gravimetric method, precipitating the total alkaloids with Mayer's reagent, is stated to give satisfactory and concordant results. (See also *Y.B.*, **1906,** 35, 210; **1907,** 71; **1908,** 85, 86; **1909,** 37; **1910,** 23.)

Gelsemine, Some Derivatives of. W. Moore. (*Proc. Chem. Soc.*, 1911, **27,** 157.) Gelsemine, $C_{20}H_{22}O_2N_2$, is stable towards alkali hydroxides and reducing agents. By treatment with oxidizing agents, on the other hand, the molecule is decomposed, but no definite products have been obtained by this means. On boiling gelsemine with concentrated HCl for some hours, three new bases are formed, which have been designated as apogelsemine, isoapogelsemine, and chloro-isoapogelsemine. Of these, apogelsemine, $C_{20}H_{24}O_3N_2$, is the chief product of the reaction, and although it cannot be crystallized, it yields well characterized crystalline derivatives. Chloro-isoapogelsemine, $C_{20}H_{23}O_2N_2Cl$, and its hydrolytic product, isoapogelsemine,

$C_{20}H_{24}O_3N_2$, are only formed in relatively small amounts. Both these bases crystallize readily, and they, and several of their derivatives, have been characterized. It has also been observed that when gelsemine-methyl-hydroxide is heated at 200° in aqueous solution, the expected gelsemethine is not produced, the methyl hydroxide losing methyl alcohol with regeneration of gelsemine.

Gnoscopine, Synthesis of. W. H. Perkin., junr. and R. Robinson. (*Proc. Chem. Soc.*, 1911, **26,** 131.) By heating together meconine and cotarnine in EtOH with K_2CO_3, dextro-lævo-narcotine or gnoscopine is formed, identical with the natural alkaloid.

Helianthus annuus Flowers, Basic Constituents of. E. Schmidt and E. Buschmann. (*Archiv. Pharm.*, 1911, **249,** 1.) Choline and betaine have been isolated as the basic constituents of the alcoholic extract of sunflower blooms, which are a commercial article in Russian pharmacy. No other alkaloid was found. The flowers have a considerable reputation in domestic medicine in Russia, and are used as a substitute for quinine for the treatment of malaria and for the diseases of children. Their therapeutic activity must be attributed mainly to the presence of these two bases. Reviewing the literature of the chemistry of *Helianthus annuus*, the authors recall that Chardon found that the involucral tracts yield a transparent resin like that of *Pinus maritima*; the fruit shells contain a violet colouring matter; the seeds a bland, sweet oil; also, according to Ludwig and Kromayer, helianthic acid or helianthotannic acid, $C_{14}H_{18}O_8$. Gorter, however, considers this to be identical with chlorogenic acid. Brautigam also found in the juice of the flowers and stem an acid, $C_9H_{10}O_{10}$, which he named solanthic acid. From the seedlings, Schulze has isolated glutamine. (See also *Y.B.*, **1910,** 185, and *General Index.*)

Hydroxycodeine, A New Alkaloid from Opium. J. J. Dobbie and A. Lauder. (*Proc. Chem. Soc.*, 1910, **26,** 339.) This alkaloid was discovered by T. and H. Smith of Edinburgh, in the mother liquors obtained in the working up of the opium alkaloids after the ordinary alkaloids have been eliminated. It has the formula $C_{18}H_{21}O_4N$, and is a tertiary base, soluble in water and the usual organic solvents. So far, it has not been obtained in the crystalline condition. On heating, it softens at about 40°

and is completely melted at 51°C. It is slightly dextrorotatory, and contains one methoxyl group. The hydrobromide, $C_{18}H_{21}O_4N.HBr$, crystallizes readily from water in large, hard, prismatic crystals. The platinichloride has the formula $(C_{18}H_{21}O_4N)_2.H_2PtCl_6$. The alkaloid appears to be a hydroxy-derivative of codeine; its absorption spectra agree very closely with those of codeine, and the colour reactions of the two alkaloids are practically identical.

Hyoscyamine, Specific Rotatory Power of, and the Relation between that of Alkaloids and their Salts. F. H. Carr and W. C. Reynolds. (*Proc. Chem. Soc.*, 1910, **26,** 180.) The specific rotatory power of pure *l*-hyoscyamine is $-22{\cdot}0°$ in 50 per cent. EtOH, whilst that of its basic ion taken in aqueous solutions of the salt is $-32{\cdot}5°$. Barrowcliff and Tutin have stated that the lower value for the free base was due to racemization occurring in the process of preparing it from its salts. It is now shown that racemization does not take place so very readily as supposed by these authors—pure *d*- and *l*-hyoscyamine having $[a]_D$ $-22{\cdot}0°$, but that the specific rotatory power of hyoscyamine and of many other alkaloids differs widely from that of their respective basic ions taken in solution of a salt. The free alkaloids behave as though they are not ionized, or only partly so, when dissolved in water or in 50 per cent. EtOH, the nitrogen retaining a triad function. The rotatory power of a number of alkaloids and their salts has been determined, and some observations bearing upon the influence of different solvents have been made.

Ipecacuanha. (*Southalls' Report*, 1911, **19,** 10.) Six samples have been assayed during the year, the amount of total alkaloid yielded by the U.S.P. process ranging from 1·88 to 2·43 per cent., giving as an average 2·06 per cent.

Kola Nuts, Determination of Caffeine in. — Desvignes. (*J. Pharm. Chim.*, 1910, **2,** 20.) Fifteen Gm. of dry, powdered kola nut is ultimately mixed with 10 Gm. of MgO. Sufficient water is then gradually added to obtain a soft paste: this is then dried spontaneously, with occasional turning over, at 20–25°C. When this mixture is perfectly dry it is transferred to a percolator fitted with a tap and treated with 30 c.c. of dry $CHCl_3$, the tap being opened to allow the $CHCl_3$ to moisten the mass. The tap is then closed and the mass macerated for 3 to 4 hours. Slow

percolation is then allowed to proceed into a tared flask, more dry $CHCl_3$ being added in 20 c.c. at a time until the powder is exhausted. The CHl_3 is then distilled off and the residue weighed as caffeine after drying. If the powder and chloroform employed in the process have been perfectly dry, this residue will be quite white. (See also *Y.B.*, **1904,** 103 ; **1907,** 88.)

Medicinal Plants, Annual Variation in Potency. J. Burmann. (*Schweiz. Woch. Chem. Pharm.*, 1911, **49,** 6.) Systematic determination of the chief active principles for four successive years, as shown below, indicates that plants grown in the same locality have undergone a marked deterioration in potency. This is attributed to the inclement weather of the past two summers. This effect is due to low temperature and less sunshine. Rain, as such, is stated not to affect the amount of active principle, except so far as its presence generally coincides with cloudy weather. Incidentally, it has been noted

Plant.	Active Principle determined.	Year.			
		1907.	1908.	1909.	1910.
		Per cent.	Per cent.	Per cent.	Per cent.
Aconitum napellus . .	Aconitine	0·104	0·100	0·042	0·054
Belladonna	Atropine	0·094	0·082	0·045	0·046
Colchicum seeds . . .	Colchicine	0·190	0·160	0·144	0·148
Digitalis ambigua . .	Digitoxine	0·134	0·120	0·067	0·069
D. purpurea	Digitoxine	0·078	0·063	0·033	0·037
Ergot	Cornutine	0·30	0·26	0·25	0·22

that the must of grapes from the same vine, which had the sp. gr. 1·091 in 1906, had the following lower densities in the four succeeding years : 1·087, 1·081, 1·079, 1·080.

Morphine, New Reaction for. G. Denigès. (*Comptes rend.*, 1910, **151,** 1062.) Ten c.c. of a dilute solution of a soluble morphine salt is treated with 1 c.c. of H_2O_2 (5 to 12 vols), 1 c.c. of AmOH, then a single drop of $CuSO_4$ solution, varying in strength from 4 to 1 of $CuSO_4.5\,H_2O$ in 100, according to the strength of the morphine solution. The mixture is well shaken both before and after adding the last reagent. A rose to deep red colour is produced, proportional in intensity to the amount of morphine present. With a 1 : 1000 solution the colour appears at once. The limit of dilution is 0·03 : 1000. With syrup of morphine

an approximate determination of the amount of alkaloid may be made colorimetrically, employing solutions of the base of known strength as standards. The solid salt may be tested by treating a particle, in a porcelain capsule, with a drop of H_2O_2, and then mixing with a drop, on a glass stirrer, of the following reagent: $CuSO_4.5H_2O$ solution 3 or 4 : 100, 1 c.c.; AmOH, 5 c.c.; distilled water, 5 c.c. A marked red colour is formed at once. Codeine, thebaine, papaverine, narceine and narcotine do not react; morphine derivatives, such as apomorphine, oxymorphine, and its phenolic esters like heroine, give a positive reaction. The reaction is probably due to the phenolic hydroxyl of the base. Fe and Mn give no reaction when used instead of $CuSO_4$.

Morphine, Toxicological Isolation of. G. Joergensen. (*Zeits. analyt. Chem.*, 1910, **69**, 484; *J. Pharm. Chim.*, 1910, **2**, 453.) The acid extract of the organ under examination is first purified by shaking out with Et_2O, absolutely free from EtOH. After rendering the liquid alkaline with AmOH or Na_2CO_3 it is again shaken out, 10 or 12 times successively, with Et_2O containing 1 to 1·5 per cent. of EtOH. Where the original acid solution is very impure, the morphine may be first extracted by shaking out with amyl alcohol after making alkaline. The residue of the bulked amyl alcohol extract is then redissolved and treated as above. If several alkaloids are suspected, the extraction of the alkaline liquid is first made with Et_2O free from EtOH, which removes the bases other than morphine. This is subsequently shaken out with the above ether-alcohol solvent.

Narcissine, an Alkaloid from the Bulbs of Narcissus pseudonarcissus. A. J. Ewins. (*Proc. Chem. Soc.*, 1910, **26**, 296.) A new alkaloid, narcissine, $C_{16}H_{17}O_4N$, has been isolated from the bulb of the common daffodil (*Narcissus pseudonarcissus*), m.p. 266–267°C., and is lævorotatory ($[\alpha]_D$ $-95{\cdot}8°$). It contains no methoxy groups, and is very stable. The hydrochloride, $C_{16}H_{17}O_4N,HCl$, is also described.

Nicotine, Determination of Commercial Products of. M. Javillier. (*Bull. Sci. pharm.*, 1911, **18**, 261.) The method of precipitation with silicotungstic acid solution previously described by Bertrand (*Y.B.*, **1909**, 63) is equally serviceable with commercial nicotine and tobacco products. In order to

avoid precipitation of a double compound of ammonia and nicotine, it is necessary that the liquid should be well diluted before adding the silicotungstic acid. Thus, with a preparation containing 5 per cent. of nicotine 5 Gm. should be diluted to 100 c.c. with water, acidified with sufficient HCl 1 : 10 until the acidity is about 1 : 100 ; the silicotungstic reagent is then added. The precipitate is then collected, introduced into a distilling flask with MgO, the nicotine distilled over and titrated in the distillate. In order to verify the purity of the nicotine thus titrated and establish the absence of pyridine, the amount of the former base must be determined optically. The titration liquid is treated with 1 or 2 Gm. of AmCl, to facilitate precipitation, rendered acid with HCl, and again precipitated as silicotungstate. The precipitate is collected and decomposed with NaOH. The liberated nicotine is extracted with $CHCl_3$ and its optical rotation taken. The specific rotation of nicotine in 1 to 2 per cent., $CHCl_3$ solution at 20°C. is −161·55°. The amount present in the solution is found by the formula $w = \frac{av}{[a]_D l}$. The result should be practically identical with that obtained by titration. The silicotungstate may also be decomposed with AmOH and the liberated nicotine shaken out with $CHCl_3$ for the above determination. Then the aqueous solution may be evaporated and incinerated, and the mixed SiO_2 and WO_3 weighed. This weight × 0·1139 will give the equivalent of nicotine. All these methods should give closely concordant results.

Orthoguaiacol Sulphonates of Some Alkaloids. G. L. Schaefer. (*J.S.C.I.*, 1911, **29**, 928.) The author gives the method of preparing orthoguaiacolsulphonic acid and its salts of morphine, codeine, ethyl-morphine, meconine, narcotine, narceine, quinine, cinchonidine, cinchonine, quinidine ; the hyoscyamine group ; methyl-strychnine, methyl-brucine ; strychnine, brucine ; and cocaine. Codeine orthoguaiacol sulphonate is stated to be largely used in America. Quinine diguaiacol sulphonate is know by the trade name "Guaiaquin." Caffeine does not form a true salt with guaiacolsulphonic acids.

Papaver orientale and P. lateritum, Alkaloids of. J. Gadamer and W. Klee. (*Archiv. Pharm.*, 1911, **249**, 39.) The whole dry plants of *Papaver orientale* and of *P. lateritum* were employed. The former gave 0·5 per cent. and the latter 0·33

per cent. of total ether-soluble alkaloids. From *P. orientale* a phenolic base, crystallizing from Et_2O in colourless, well formed crystals, m.p. 204–205° C., was obtained. No protopine was detected. The alkaloid from *P. lateritum* was also of a phenolic nature, but was not identical with that of *P. orientale*. The amount of material available was insufficient for further examination. Some colour reactions are given.

Papaverine and Cryptopine. A. Pictet and C. H. Kramers. (*Berichte*, 1910, 1329.) The reactions which have been considered hitherto, to be characteristic of papaverine are due to the presence of cryptopine, which is found to be invariably present in commercial papaverine. As much as 30 Gm. of this rare opium alkaloid has been separated from 800 Gm. of commercial papaverine. Cryptopine, $C_{21}H_{23}NO_5$, crystallizes from alcohol in short transparent prisms, melting at 218° C. Its hydrochloride is very soluble in water and only sparingly dissolved by HCl. The bichromate, in fine yellow prisms, is very soluble in water. It is a saturated base, is not attacked by nascent H, and contains two methoxyl groups. It gives a deep violet colour with strong H_2SO_4, and marked colour-reactions with Erdmann's, Froehde's, Mandelin's, and Labat's reagents. Pure papaverine gives no reaction whatever with any of these, nor with Lafon's and Marquis's reagents. Merck, who originally isolated papaverine, considered the bluish-violet colour given with H_2SO_4 to be distinctive of that base; Hesse attributed it to papaveramine, $C_{21}H_{25}NO_6$, which he found to accompany natural papaverine.

Pseudomorphine, Preparation of, with an Inorganic Catalysator. G. Denigès. (*Bull. Soc. Chim.*, 1911, **9**, 264.) Ten c.c. of a 1 : 25 solution of $CuSO_4$ is treated with sufficient N/10 solution of KCN to discharge the blue colour. Separately, morphine hydrochloride, 5 Gm., is dissolved in warm water, 200 c.c.; when cold 20 c.c. of neutral 10 to 12 per cent. solution of H_2O_2 is added. The mixture is then treated with the copper potassium cyanide solution. On shaking, turbidity occurs and in a few minutes, a reddish colour appears, O is evolved, and the colloidal precipitate becomes crystalline. In an hour the yellowish crude product is collected, washed successively with cold water, EtOH, and Et_2O; finally dried below 100° C. It is then purified by boiling in dilute AmOH with animal charcoal. The yield is 20 to 25 per cent. of the morphine hydrochloride taken.

Ptomaines present in Tinned Fish and Crustacea used for Food. A. Desgrez and F. Caius. (*Bull. Comm.*, 1911, **39**, 196.) The authors have made the interesting discovery that oily bases, giving the reaction of Selmi for ptomaines, the formation of Prussian blue with Fe_2Cl_6 and $K_6Fe_2Cy_{12}$, and the production of a yellow colour with HNO_3 and AmOH, are invariably present in canned fish or pastes. Those bases so far isolated are, however, relatively harmless. They probably belong to the same class as those found by Gautier in cod liver oil. These have a favourable action on the appetite and the general nutrition. The material examined comprised tunny, sardines and mackerel preserved in oil; herrings and mackerel pickled in white wine; and tinned salmon and lobster. The alkaloids were extracted by the Stas-Otto method. The ptomaines thus isolated were almost all soluble in Et_2O. They were more or less oily pale yellow liquids, with a peculiar aromatic odour; except those from lobster and salmon, which gave off a marked bug-like smell. At the moment of opening the substances examined contained from 0·2 to 0·6 Gm. of these bases in 1 kilo. For the same article, the amount was practically constant. Fish preserved with skin and fins contain more, 0·47 Gm. per kilo, than those with flesh only, such as tunny, lobster and salmon, 0·30 per kilo. In pastes or boxes with contents of homogeneous consistence, the amount of ptomaines is greater in the centre than at the sides. Whole fish show marked variations in the amounts in different portions. The amount of ptomaines increases markedly after the second day of opening the tin. In opened packages, the presence of oil does not retard the formation of ptomaines; on the contrary, it appears to favour their development. In no case was any gas or putrid odour found on opening any of the packages examined. This would seem to indicate that the ptomaines found were present before the material was enclosed in the tin or package. It is possible that these bases may occur in the fresh fish. [These results appear to indicate that the mere presence of oily bases giving the reactions for ptomaines is not in itself sufficient to indicate that tinned or preserved fish is therefore unsuitable for use for food, since perfectly sound and wholesome preparations may contain them.—Ed. *Y.B.*]

Quinine Silicotungstate, Formula for. — Javillier and B. Guerilhaut. (*Bull. Sci. Pharm.*, 1911, **18**, 93.) The

cinchona alkaloids may be conveniently precipitated as silicotungstates for gravimetric determination. The quinine salt has the formula $SiO_2 \cdot 12WO \cdot 2H_2O \cdot 2C_{20}H_{24}N_2O_2 + 7H_2O$, under all conditions.

Sanguinaria canadensis Alkaloids. T. Kózniewski. (*Chem. Zentr.*, 1910, **2**, 1932.) For the purification and separation of the chelerythrine, sanguinarine, and protopine contained in the roots of *Sanguinaria canadensis*, the slight solubility of the sulphates of the first two alkaloids was taken advantage of. The greater part of the sanguinarine is present in the root not in the form of a salt of the free base, but in the form of a stable compound, the salts of which have a red colour, and which yields sanguinarine on hydrolysis. Sanguinarine, $C_{20}H_{15}NO_4$, separates from EtOH or a mixture of EtOH and $CHCl_3$ in crystals containing $\frac{1}{2}$ mol. of EtOH, m.p. 212°C. It forms a periodide, $C_{20}H_{15}NO_4.I_2.HI$, which separates in needles, m.p. 205°C., from aqueous solution. Chelerythrine periodide, $C_{21}H_{17}NO_4.I_2.HI$, obtained by treating a solution of the alkaloid in 95 per cent. alcohol or a mixture of $CHCl_3$ and EtOH with a solution of iodine in CS_2, forms ruby-red needles, m.p. 225°C., very slightly soluble in organic solvents, with the exception of acetone, in which it is easily soluble.

Strychnine and Brucine, Separation of, from Tropeines and Coca Alkaloids. H. C. Fuller. (*J. Ind. and Eng. Chem.*, 1910, **2**, 378.) A known weight of the mixed alkaloids is dissolved in N/5 alcoholic KOH, using 15 c.c. for each 0·10 Gm. of cocaine or atropine supposed to be present. The solution is then heated in a stoppered flask on the water-bath for 1 hour. The liquid is then transferred to a dish, and the alcohol is evaporated off. The residue is transferred to a separator with water and $CHCl_3$; it is then shaken out with three portions of $CHCl_3$. The bulked $CHCl_3$ extract is shaken out with 10, 10, and 10 c.c. of dilute H_2SO_4, which removes the brucine and strychnine. These are then liberated with AmOH, and shaken out with $CHCl_3$. This is washed with water, filtered through cotton wool into a tared dish, evaporated, and the residue weighed. This treatment with alcoholic KOH decomposes the atropine and coca alkaloids, but does not affect the nux vomica bases.

Strychnine Arsenate, Composition of. W. A. Puckner and L. E. Warren. (*Proc. Amer. Pharm. Assoc.*, 1910,

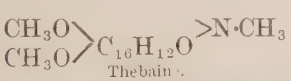
58, 1007.) Since strychnine arsenate as found on the American market varies somewhat in composition, the following provisional description of the product has been prepared. Strychnine arsenate, $C_{21}H_{22}N_2O_2,H_3AsO_4 + \frac{1}{2}H_2O$· is the binary strychnine salt of arsenic acid. Strychnine arsenate should contain alkaloid corresponding to between 68 and 70 per cent. of anhydrous strychnine. It is a white, crystalline powder; or in small, colourless or faintly yellowish, transparent, or slightly opaque prisms; or in white, acicular crystals; odourless and having an extremely bitter taste. Slowly soluble in about 20 parts of water at 25°C., more readily soluble in hot water; slightly soluble in EtOH, insoluble in $CHCl_3$ or in Et_2O. Its aqueous solutions are colourless, and are precipitated by alkali hydroxides and by alkali carbonates. It is incompatible with alkalies and their carbonates, with tannic acid and other precipitants of the alkaloids. Strychnine arsenate undergoes hydrolysis in aqueous solution, so that if such a solution be shaken with $CHCl_3$ an appreciable quantity of free alkaloid may be removed. When heated to 100°C. the salt loses its water of crystallization. At about 210°C. it begins to decompose without melting. At still higher temperatures the salt chars, ignites and is finally dissipated. When dried at 100°C. strychnine arsenate should not lose more than 2 per cent. of its weight (absence of an undue amount of water). If an aqueous solution of strychnine arsenate (1 : 50) be made slightly alkaline with AmOH and the alkaloid subsequently removed by shaking with $CHCl_3$, portions of the solution after being boiled to expel the dissolved $CHCl_3$ and excess AmOH and acidified with nitric acid, should not give more than a very slight test for sulphates. Another portion of this solution should give upon the addition of magnesia mixture a white precipitate of magnesium-ammonium arsenate which soon becomes crystalline. Another portion of this solution, when treated with a few c.c. of diluted sulphuric acid and a few drops of iodine test solution, should not discharge the colour due to iodine (absence of arsenite). The usual tests for the identity of the alkaloid and of the acid are also given.

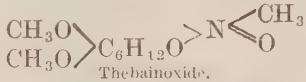
Strychnos kipapa, Alkaloids of. — Vinci. (*Archiv. Pharm. Therap.*, **1910,** 20 (1); *Pharm. Zentralh.*, 1910, **51,** 828.) The root bark of *Strychnos kipapa* contains 5 per cent. of strychnine, and the woody portion of the root 0·1 per cent. The stem-bark contains 2 per cent.; and the true wood 0·16 per cent.

These parts contain a smaller amount of brucine. The leaves, however, contain 0·5 per cent. of the latter alkaloid.

Strychnos Nux Vomica, Alkaloids of, during Germination. O. Tunmann. (*Archiv. Pharm.*, 1910, **248**, 644.) In the endosperm, strychnine and brucine occur only in the oil plasma of the cell contents. The embryo of the dormant seed contains only brucine. After minutely tracing the fluctuation in the alkaloidal contents of various parts of the seed, the total amounts found are stated to be: In the original seeds 2·98 per cent. of total alkaloids; separated shells, 2·11; young radicles, 4·48; older radicles, 3·72; hypocotyls, 2·43; young yellow cotyledons, 6·62; older green cotyledons, 4·65 per cent.

Thebaine, Morphine and its Esters, Action of H_2O_2 on. M. Freund and E. Speyer. (*Berichte*, 1910, **43**, 3310.) When thebaine is digested with 30 per cent. H_2O_2, and the solution is treated with HCl, the hydrochloride $C_{19}H_{21}NO_4 \cdot HCl$ is formed. If this substance is treated with SO_2 thebaine is again formed. This base is therefore an amino-oxide:


Thebaine.


Thebainoxide.

Morphine, codeine and ethyl morphine (dionine) are also easily converted into amino-oxides by H_2O_2. *Thebainoxide hydrochloride*, $C_{19}H_{21}NO_4 \cdot HCl$, crystallizes from alcohol in felted needles, m.p. 238–239°C., with decomposition. *Morphinoxide*, $C_{17}H_{19}NO_4$, crystallizes in small prismatic needles from alcohol 50 per cent.; m.p. 274–275°C. It is insoluble in $CHCl_3$, C_6H_6 and acetone. *Codeinoxide*, $C_{18}H_{21}NO_4$, separates from strong aqueous solution in rectangular tablets, m.p. 230–231°C. Its salts are readily crystallized. The nitrate forms long asbestos-like needles. *Ethyl-morphinoxide*, $C_{19}H_{23}NO_4$, crystallizes from water in handsome felted needles, m.p. 220–221°C. Physiological experiments show that morphinoxide nitrate has remarkably little action, compared with morphine, and codeinoxide is without pronounced action also.

Vernine. E. Schulze. (*Zeits. physiolog. Chem.*, 1910, **66**, 128; *J. Pharm. Chim.*, 1910, **2**, 361.) Although vernine has been found in 10 different species of plants, its isolation is difficult and it only occurs in small quantities at a short time

during the life of the plant. Originally found in young plants of *Vicia sativa*, subsequent work with more mature material failed to indicate the presence of a trace. Sufficient has been isolated from the germs of *Cucurbita pepo*, however, to establish its formula, $C_{10}H_{13}N_5O_5 + 2H_2O$, when crystallized from hot water. When hydrolized, it gives guanine and a pentose which has not yet been identified. The above formula is identical with guanosine isolated by Levene and Jacobs. It is possible that the two bases are identical.

ANIMAL PRODUCTS

Ascarides, Toxic Action of. — Goldschmidt. (*Münch. Med. Woch.*, 1910, [32]; *Nouveaux Remèdes*, 1911, **28**, 239.) Living ascarides give off a disgusting odour, their exhalations occasion intense irritation to the nasal mucous membrane and produce lachrymation, with symptoms resembling those of hay fever. Some individuals are more susceptible than others. Even those who are unaffected by the human *Ascaris lumbricoides* are attacked by the exhalations of *A. megalocephala* of the horse. Valerianic acid is said to be one of the evil-smelling substances given off by these parasites.

Axin, Mexican Lacquer. H. Bocquillon. (*J. Pharm. Chim.*, 1910, **2**, 406.) This is a fatty substance obtained from the Mexican *Coccus axin*, an insect which occurs on *Spondias lutea*, *Xamthoxylon clava-herculis*, and *X. pentanome*. It is obtained by boiling the insects in water and skimming off the fat which rises. The residual insects are then pressed. The fat thus obtained when fresh has the consistence of butter. On contact with air it dries and hardens, like Japan lac. It makes an excellent varnish for wood, metal, or earthenware.

Cantharidin, Determination of, in Tincture, Oil, and Plaster of Cantharides. R. Gaze. (*Apoth. Zeit.*, 1911, **26**, 332.) *Tincture:* Tincture, 50 Gm.; water, 25 Gm. and Na_2CO_3 solution, 1 in 2, 1 c.c. mixed to give a slightly alkaline reaction are evaporated in a Soxhlet flask to dryness on the water-bath. The residue is then treated with 10 c.c. of water, and 2 c.c. of 25 per cent. HCl, and the solution is transferred to a small separator. The flask is washed out with 10 c.c. of $CHCl_3$, which is added to the acid liquid in the separator. The mixture is thoroughly shaken up and the separated $CHCl_3$ is run off into a small flask.

The acid liquid is shaken out again with 5 and 5 c.c. of $CHCl_3$. The bulked $CHCl_3$ solution is evaporated at a gentle heat on the water-bath, the last portion being blown off with a bellows. After standing for 12 hours the residue is treated with 10, 5, 5, 5, and 5 c.c. in succession of petroleum ether. The bulked petroleum ether solution is filtered, the air-dry residue in the flask and the filter are washed first with 10 c.c. of water, to which one drop of Am_2CO_3 solution has been added, and then with pure water, and dried at 50°C. The residue is then dissolved in a little acetone and the solution is filtered through the same filter used throughout into a small tared flask. Then both are washed out with more acetone. The solvent is evaporated off at a gentle heat with the aid of a bellows. The brownish yellow residue is first dried carefully at 50°C., and finally in the water oven, to constant weight. Tinctures (1 : 10 by weight) were found to contain from 0·0318 to 0·0684 Gm. of cantharidin. Tincture prepared by the author from cantharides containing 0·1104 to 0·1060 of cantharidin in 10 Gm. gave 0·068 in the tincture and 0·044 in the marc. About three-fifths of the cantharidin present in the beetles goes into solution in the tincture.

Oil.—Cantharides oil, 20 Gm., and C_6H_6, 40 Gm., are mixed in a separator. HCl 25 per cent., 1 c.c., and water, 10 c.c., are added, and the mixture is frequently shaken up during half an hour. Then Na_2CO_3 solution, 33 per cent., 5 c.c., and water, 10 c.c., are added and strongly shaken up for 2 minutes. Separation of the alkaline liquid is then aided by a gentle heat over the water-bath. When clear the alkaline liquid is separated and the C_6H_6 solution washed first with 5 c.c. of the Na_2CO_3 solution and 20 c.c. of water, then with 20 c.c. of water alone. The bulked aqueous extract is evaporated to dryness. The dry residue is treated with 20 c.c. of water and the solution filtered through a small filter containing a little sand to aid filtration, and then washed with a little water. The filtrate is made acid with HCl and shaken out as before with $CHCl_3$. The process is then continued on the same lines as given for the tincture, any crystals of cantharidin separating from the oil left by petroleum ether washings, on evaporating these, being washed free from oil with a little petroleum ether and added to the rest of the cantharidin. Oil of cantharides, made from the same beetles as the tincture, was found to contain much more cantharidin, the 1 : 10 oil containing 0·097 per cent. or nearly all the active principle present.

Plaster.—When cantharides plaster is treated by a modification of the above process, the resulting cantharidin is accompanied by a waxy impurity, from which it has not been satisfactorily separated for quantitative weighing. (See also *Y.B.*, **1907,** 31, 32; **1908,** 40; **1910,** 39.)

Cheese, Gorgonzola, Barium Sulphate in Rind of "Coated" Cheeses. E. Henks. (*Analyst*, 1911, **36,** 61.) About half the Gorgonzola cheese imported into this country is naturally coated. The rest is artificially coated with a thick layer of barytes and tallow, coloured red on the outside with oxide of iron. The weight of this coating amounts to from 16 to 27 per cent. of the whole weight of the cheese. The natural rind amounts to 2 or 4 per cent. The heavy red coat contains 81 to 86 per cent. of barytes and 12·7 to 19·0 per cent. of tallow. This barytes contained 91 to 96 per cent. of $BaSO_4$. Importation of coated cheeses into France is prohibited. The rind of uncoated cheese may contain a trace of barytes, which is dusted over them as a dryer, if they sweat.

Civet. E. Charabot and A. Hébert. (*Bull. Soc. Chim.*, 1910, **7,** 687–691.) Normal civet should leave less than 6 per cent. of insoluble residue when treated with alcohol and ether, should contain more than 50 per cent. of fatty acids obtainable by saponification, and the saponification value should be greater than 100. (See also *Y.B.*, **1905,** 60.)

Cochineal, Fat of. — Huerre. (*J. Pharm. Chim.*, 1911, **3,** 608.) Cochineal fat is not, as has been previously stated, a mixture of glycerides. Ninety per cent. of it consists of free fatty acids; oleic acid, 35 per cent.; linoleic acid, 8 per cent.; myristic acid, 57 per cent.

Hepatic Extract, Influence of Solvents on Activity of. E. Choay. (*J. Pharm. Chim.*, 1911, **3,** 525, 574.) A very detailed series of experiments show that treatment of powdered hepatic extract with $CHCl_3$ increases the catalytic action of the insoluble residue towards H_2O_2. On the other hand, extraction with acetone, and still more, with petroleum ether, lessens this action very markedly.

Luciferesceine, a Fluorescent Substance from Luminous Insects. F. A. McDermott. (*J. Amer. Chem. Soc.*, 1911, **33,** 410.)

In 1909, Coblentz showed that the firefly, *Photinus pyralis*, contains a substance which affords bright blue fluorescent solutions with alcohol. The same substance has since been found in other fireflies, all of which have a strong peculiar odour, and emit a sticky, milky fluid, containing a large amount of the fluorescent principle. Dubois found a fluorescent substance which he considered to be æsculin in the large Cuban elaterid firefly, the cucuyo, *Pyrophorus noctiluca*. This may not be identical with the fluorescent matter of *Photinus*, but it is nevertheless remarkable that two such widely different luminous insects should both give a fluorescent secretion. There is no evidence to show, as yet, that the fluorescent substances have any connexion with the luminosity of the insect. They occur, moreover, in many lower organisms which are not luminescent. The author has isolated the fluorescent substance from various species of *Photinus*, and names it luciferescein. It appears to possess slightly basic properties. It is a yellowish amorphous substance, soluble in alcohol, water and in amyl alcohol, less soluble in ether, insoluble in chloroform, carbon tetrachloride, and benzol. Stable at ordinary temperatures below 100°C., it melts and boils above that temperature, giving off an unpleasant fishy odour. When injected into animals it appears to have a toxic action, but this might be due to a trace of cantharidin derived from the beetles, and accompanying the luciferescein.

Milk, Cooked, Microscopical Detection of. W. Morres. (*Rev. Gen. Lait.*, 1910, 257 ; *Annales des Falsific.*, 1910, **3**, 448). In milk which has been heated and then slowly cooled to 20°C., some fat globules are seen under the microscope to be larger than others, and to contain small crystallizations, resembling the mycelia of moulds in appearance. In pasteurized milk slowly cooled to 8–10°C. the crystals are so abundant that the fat globules assume the appearance of geometric figures. They are seen better if the droplet of milk on the slide is diluted with one or two droplets of water or of glycerin.

Pepsin Assay, Criticism of the French Codex Method for. L. Portes. (*J. Pharm. Chim.*, 1911, **3**, 341.) In the official French Codex method, the digestion liquor, after treating fibrin with pepsin for 6 hours, is required to give no turbidity when 10 c.c. are treated *at the ordinary temperature* with 20 drops of HNO_3, sp. gr. 1·394. The author states that this definition of

the temperature is not sufficiently precise. The same digestion liquid will give no precipitate at 20°C., a slight turbidity at 15°C., and sufficient to condemn the pepsin at 10°C. The temperature at which the test is to be made should be stated. Most French commercial pepsins will pass the official requirements at 20°C.; and the majority at 15°; but only those of very high activity will give no precipitate at 10°C.

Pepsin Preparations, Certain, Proteolytic Action of. G. I. Mackay. (*Australas. Pharm. Conf. Pharm. J.*, 1911 [4], **32,** 268.) All the bismuth preparations with pepsin which contain a trace of free alkali are found to be totally devoid of peptic action on egg albumin. It is regarded as wasteful to prepare such compounds, since the digestive action of the pepsin is absolutely destroyed. Employing the neutral form of Liquor Bismuthi suggested by Cowley, this is not the case.

Pepsin, Suggested International Standard and Test for. — Herrod and T. Maben. *Internat. Congress Pharm.*, Brussels. (*Pharm. J.*, 1910, [4], **31,** 368.) After comparing the official standards and tests of various pharmacopœias, it was suggested that the standard should be 1 : 2000, determined as follows: Take coagulated white of egg (obtained by boiling fresh eggs for 10 minutes), pass through a No. 40 sieve, and press between two sheets of filter-paper to remove surplus moisture; weigh 10 Gm., and place it in a flask of 200 c.c. capacity, containing 100 c.c. of distilled water previously heated to 52°C., 0·25 per cent. absolute HCl, and 5 c.c. of a 0·1 per cent. solution of the pepsin. Place the flask in a water-bath at 52°C., and digest at that temperature for 2 hours, stirring gently every 15 minutes with a rotatory movement by means of a glass rod. At the expiration of 2 hours the albumin should be dissolved, the solution having an opalescent appearance. This method was referred to the International Commission.

Peptones, Commercial. G. Pépin. (*Bull. Sci. pharm.*, 1910, **17,** 594.) Eleven commercial peptones were examined, including products obtained by the action of pepsin on flesh, gelatin, and fibrin; and of trypsin on flesh and fibrin. The N present in the ash-free peptone varied from 12·58 to 17·56 per cent.; and the ratio of the total N to the amino-N ranged from 3·92 to 36·44. Tryptic peptones contain much more amino-N than peptic peptones; and of the latter those [from gelatin

contained least. The peptic peptones from flesh contained most ash, some as much as 20 per cent. The main constituents of this were NaCl and $CaCl_2$, the presence of large quantities of $CaCl_2$ being due in some instances to $CaCO_3$ having been used to neutralize the free HCl after peptonization. The peptic peptones never contained more than minute traces of P, Mg or Fe.

Propolis. M. Kuestenmacher. (*Berichte Pharm.*, 1911, **21,** 65.) Propolis consists of varying proportions of wax and balsam. The balsam is regarded as a useful antiseptic dressing for wounds. It also makes a fine brilliant varnish. Propolis is stated to be used to flavour tobacco, and its use as a perfume for soap is suggested. In the analysis of propolis, the insoluble constituents are separated by boiling the sample with five successive portions of twice its weight of absolute EtOH, and subsequently, if necessary, extracting the residue with $CHCl_3$. The final residue (consisting of wood fibre, débris, etc.) is weighed and microscopically examined. The EtOH filtrate, on cooling yields a considerable precipitate, which is washed, first with absolute EtOH and then with EtOH 96 per cent. until the washings are colourless. The insoluble Wax A is weighed. The filtrate from Wax A is gradually diluted with water until the liquid has an EtOH strength of 40 per cent. by weight. The resulting precipitates are immediately filtered off, and washed with 60 per cent. alcohol to obtain Wax B. If the residue I after boiling with alcohol is coherent, it is extracted with hot xylol or $CHCl_3$, and on cooling the extracts, any pa affin wax (ceresin, etc., from artificial combs) separates, and is washed with EtOH, pressed, dried, and weighed. The filtrate invariably still contains large quantities of a yellow wax (C). which, after evaporation of the solvent, is boiled with EtOH and separated from the balsam by fractional dilution. The united ialcoholic filtrates and washings from Waxes A, B, and C are distilled *in vacuo* until the residue is completely transparent. The balsam thus obtained is of the consistence of a syrup and appears yellow to red by transmitted light. Any odour of turpentine oil in the balsam indicates that the wax of the artificial comb had been treated with colophony, and other substances, to render it more transparent, and that these bodies had passed into the propolis. On destructive distillation the balsam yields at 160°C. a nearly colourless essential oil with a pronounced odour of hyacinth. If the distillation

is continued up to 260°C. cinnamic acid passes over. The essential oil may also be separated from the balsam by means of various solvents. The balsam contains about 10 per cent. of cinnamyl alcohol. The essential oil consists of cinnamyl alcohol in combination with the resins of the propolis. It darkens on keeping, and becomes thick when cooled below 10°C., and a crystalline solid at a lower temperature. The resin, $C_{26}H_{26}O_6$, to which the physical properties of the propolis are due, forms from 60 to 85 per cent. of the total constituents, whilst the tannin, which gives to the balsam its colour, amounts to about 4 per cent. The resin is left in a pure condition after evaporation of the filtrate from the essential oil and tannin. Samples of propolis examined by the author gave the following results :—

	Insoluble Substances.	Wax.	Balsam.
	Per cent.	Per cent.	Per cent.
Propolis (pissoceros)	5 (pollen only)	Trace	95 (red) containing 10 per cent. of cinnamyl alcohol
Propolis . .	5	35	60 (red) containing 10·7 per cent. of cinnamyl alcohol
Propolis . .	18	22	60 (red) containing 9 per cent. of cinnamyl alcohol
Commosis .	17	20	73 (brown) containing 9·5 per cent. of cinnamyl alcohol
Propolis from Thuringia	15·2	23·75 (Wax A, 9·6 ; Wax B, 3·64 ; Wax C, 4·83 ; Ceresin, 5·7)	61·04 (Cinnamyl alcohol, 7·32 ; tannin, 2·27 ; resin, 51·44 per cent.)
Propolis from Posen	14·7	33·3 (Wax A, 6·60 ; Wax B, 1·0 ; Wax C, 21·3 ; Ceresin, 4·4)	52 (Cinnamyl alcohol, 3·12 ; tannin, 2·08 ; resin, 46·8)

Propolis balsam is completely soluble (1 : 10 solvent) in cold methyl alcohol, in acetic acid, and in sulphuric acid ; sparingly soluble in cold acetone, ether, and amyl alcohol : and nearly insoluble in cold benzene and petroleum ether. (See also *Y.B.*, **1904,** 148 ; **1908,** 162.)

Propolis, Characters of Genuine. K. Dieterich. (*Chem.*

Zeit., 1910, **34**, 1006.) The ash should not amount to more than 2 per cent. The aqueous extract should amount to 5 to 6 per cent., be strongly opalescent and strongly aromatic; the amount of crude propolis wax should be as small as possible, not greatly exceeding 45 per cent.; and the amounts of propolis resin and propolis balsam as high as possible, about 30 per cent. The insoluble residue should be as small as possible, not more than 13 to 14 per cent.; it should also contain no metallic particles or other heavy adulterants. The crude propolis is extracted with petroleum ether. The residue from this was boiled with alcohol 70 per cent. This dissolves propolis balsam and leaves propolis wax insoluble. The residue insoluble in petroleum ether is treated with alcohol 96 per cent., which dissolves the propolis resin, leaving foreign impurities insoluble.

Rattlesnake Venom. E. S. Faust. (*Archiv. exp. Pharm.*, 1911, **64**, 244; *Apoth. Zeit.*, 1911, **26**, 226.) Bufotalin, the toad poison, $C_{31}H_{46}O_{10}$, may be written $2(C_{17}H_{23}O_5)$. Ophiotoxin, cobra venom, is $C_{17}H_{26}O_5$. Crotalotoxin, the poison of the North American rattlesnake, *Crotalus adamanteus*, is $C_{34}H_{54}O_{24}$, or $2(C_{17}H_{26}O_{10}) + H_2O$ (?) All these toxalbumins show a close relationship to the vegetable sapotoxins.

CLINICAL TESTS

China Green in Nutrient Medium for Typhoid Cultures. (*Merck's Report*, 1910, **23**, 158.) F. W. Werbitski finds that China green almost entirely inhibits the growth of *B. coli*, but does not appreciably affect the growth of the typhoid bacillus. The culture medium is thus prepared. Lean beef, free from sinew, 500 Gm., is machine minced, and suspended in water 1000 c.c. This is boiled for 45 minutes, the volume of water being maintained. It is then strained and pressed through a cloth; peptone, 10 Gm., and NaCl, 5 Gm., are added and the mixture is again boiled. After quickly cooling, it is filtered through paper. In the filtrate 3 per cent. of agar-agar is dissolved in a steam-bath and the solution is neutralized with N/NaOH solution. It is then filtered into 100 c.c. flasks and sterilized. Immediately before use, the gelatinized contents of a flask is melted by warming, and when cooled to 65°C. about 1·5 c.c. of 1 : 50 solution of China green is added. This is then used for dish culture with the suspension of the fæces in the usual manner. After 20 hours'

incubation the dish is washed with 10 c.c. of normal saline solution, and a few loops of the suspension thus obtained are used for cultures.

Cuorin, A Reagent for Syphilis Diagnosis. V. Terucchi and H. Toyoda. (*Wien. Klin. Woch.*, **1910,** 919; *Apoth. Zeit.*, 1911, **26,** 319.) Cuorin is a diphosphatide, $C_{17}H_{125}NP_2O_2$, isolated from heart muscle by Erlandsen. It is rapidly altered by auto-oxidation and is very hygroscopic. When unoxidized it is readily soluble in Et_2O and sparingly so in water. When oxidized these solubilities are reversed. The 0·3 in 100 aqueous solution of cuorin is employed for the serum test for syphilis; the serum is diluted with 5, 10, 20, and 40 volumes of physiological NaCl solution, and treated with 0·5 c.c. of the reagent. The mixture is then maintained at 37°C. for 2 hours or longer with a very weak serum. The normal sera of most animals except that of monkeys and rabbits, gives a precipitate. Normal human serum does not; nor does the serum from cases of syphilis in the first stage, tuberculosis, typhoid, beri beri or gonorrhœa. Syphilis after the first stage, malaria, and leprosy give positive results.

Fluorescein-Sodium as a Diagnostic for Ophthalmic Use. (*Merck's Report*, 1910, **23,** 211.) After small doses of fluorescein sodium the whole body becomes yellow, as if the patient were jaundiced; but this colour disappears in 24 hours. In the healthy eye, no colour is observed, as the colouring matter is retained in the posterior ocular chamber. In intra-ocular disease, however, the vitreous humour is coloured bright green, whereas in conjunctivitis this does not occur. The administration of fluorescein, therefore, enables the practitioner to distinguish between iritis or glaucoma, and conjunctivitis. The green colour in the former diseases appears very quickly, sometimes within 20 minutes after administration. Hamburger has given 24 to 30 grains to children, and as much as 90 grains to adults. The taste is nauseous and needs to be disguised with flavouring agents.

Sputum, Detection of Albumin in. H. Roger. (*Acad. de Med.*; *Bull. Sci. pharm.*, 1911, **18,** 377.) The fresh sputum is suspended in water; a few drops of acetic acid are added to coagulate mucus, and the mixture is filtered. NaCl is then added to the clear filtrate, which is heated; a turbidity indicates

albumin, or other usual tests may be applied. The absence of this indicates also the absence of tuberculosis ; since tuberculous sputum invariably contains albumin. But its presence does not necessarily indicate tubercule, since albumin is found in the sputum in several other morbid states.

Urine Analysis, General Review of Recent Work in. G. Mellière. (*J. Pharm. Chim.*, 1911, **3,** 441.) A very complete general review of recently published literature of the subject. Reference is made to original papers, but no detailed processes are given.

Urine, Chemical Reactions of, in Tuberculosis. J. Jefimow. (*Münch. Med. Woch.*, 1910, 919 ; *Pharm. Zentralh.*, 1911, **52,** 548.) Freshly passed urine is heated to boiling and then tested with litmus paper. In the active stage of tuberculosis it gives an amphoteric reaction. In the last advanced stage of the disease, it is strongly acid. Freshly passed urine is treated with a small amount of $Pb2C_2H_3O_2$ solution and filtered through a double filter. A little of the filtrate is heated to boiling ; and while still hot treated with 10 to 20 : 100 alcoholic solution of $AgNO_3$, added drop by drop. After adding 5, 10, or 12 drops, the urine of patients suffering from the first or latent stage, or the second or active stage, of tuberculosis will show a brick red colour, acquiring a violet shade. That of those in the third stage gives a dark red colour with a cherry-red shade. The urine of healthy persons, and of those suffering from other diseases does not give the reaction.

Urine, Detection and Determination of Acetone in. G. Denigès. (*Bull. Soc. Pharm. de Bordeaux* ; *J. Pharm. Chim.*, 1910, **2,** 130.) In a capacious flask, mix urine 100 c.c., H_2SO_4 0·5 c.c. ; and distil over at the rate of 1·5 to 2 c.c. a minute. Collect 10 c.c., take 2 c.c. of this, mix it with 2 c.c. of $HgSO_4$ solution, and immerse in the boiling water-bath. In a few minutes the characteristic precipitate of the mercury-acetone compound will appear if that substance be present. For a quantitative determination proceed as above, but collect 25 c.c. of distillate, and titrate it with N/10 iodine. (See also *Y.B.*, **1904,** 177 ; **1906,** 78 ; **1907,** 165 ; **1908,** 204 ; **1910,** 51.)

Urine, Detection of Bile Pigments in. F. A. Steensa. (*J. Pharm. Chim.*, 1910, **2,** 130.) Ten c.c. of the urine, unfiltered,

is treated with Na_2CO_3 solution 1 : 5, 10 drops ; $CaCl_2 \cdot 2H_2O$ solution 1 : 5, 20 drops. The precipitate is collected and washed with water. If it be white, no bile pigments are present ; if yellow, it is dissolved in 3 c.c. of a mixture of EtOH 96 per cent., 95 c.c., and H_2SO_{42}, 5 c.c. On adding a drop of 1 : 200 solution of NaNO, to this a green colour is formed if bile pigments are present. If much urobilin be present, the $CaCO_3$ precipitate will be pink ; this may be removed by free washing. (See also *Y.B.*, **1904,** 178 ; **1906,** 78, 80 ; **1908,** 202.)

Urine, Detection of Urobilin, Urobilinogen, and Blood in. A. Florence. (*J. Pharm. Chim.*, 1910, **2,** 160.) The so-called hæmapheic urines are often very troublesome to test, on account of their intractable precipitates rendering filtration difficult. The following reagent, which keeps perfectly, is very useful for these. Pyridine, 50 Gm. ; alcohol, 50 Gm. ; chloroform, 50 Gm. ; zinc acetate, 7·5 Gm. Two or 3 c.c. of the urine is treated with twice its volume of reagent, and mixed without emulsifying. If no pigments be present, the lower layer, on separation, will be colourless and will remain so. In presence of urobilin, it will show a fine green fluorescence. If urobilinogen be present a fluorescence slowly develops. With biliverdin, it will be greenish, soon becoming fluorescent. With blood, it will be pink to cherry red. All these coloured solutions give spectral bands of great sharpness. The reactions are sufficiently definite to serve for approximate colorimetric determination of the substances named. With this reagent no filtration and no skilled manipulation is needed.

Urine, Determination of Glucose in, by Means of Arsenic. F. M. Litterscheid and J. Bornemann. (*Zeits. angew. Chem.*, **22,** 2423 ; *Nouveaux Remèdes*, 1911, **28,** 164.) When glucose is present in quantities not exceeding 1 per cent., the following indirect method gives more definite results than the usual Fehling reduction process. The copper solution used should contain 49·948 Gm. of $CuSO_4 + 5H_2O$ in the litre. A standard As_2O_3 solution is made containing 9·9 Gm. per litre. Fifty c.c. of the $CuSO_4$ solution and 20 c.c. of the usual alkaline tartrate solution are mixed in a graduated 200 c.c. boiling-flask. Twenty-five c.c. of the urine, containing not more than 1 per cent. of sugar, is then added, and the mixture is boiled for exactly 2 minutes. Then 50 c.c. of the As_2O_3 solution is added

at once, followed by 30 c.c. of acetic acid, 96 per cent. When cold the volume is made up to 200 c.c. After filtration, the As_2O_3 remaining is titrated in 100 c.c. of the filtrate with N/10 iodine in the usual manner. Each c.c. of N/10 iodine = 0·5 c.c. of the As_2O_3 solution = 0·00636 Gm. of Cu = 0·00327 Gm. of glucose under the conditions of the experiment.

Urine, Determination of Hæmapheic Pigments in. A. Florence. (*J. Pharm. Chim.*, 1910, **2,** 161.) The urine, in a separator, is mixed with one-fifth its volume of pure commercial acetone; the mixture is then treated to saturation with pure powdered crystals of Am_2SO_4. The acetone separates; the lower Am_2SO_4 solution is run off; the acetone is washed with saturated aqueous solution of Am_2SO_4; then dried by shaking with some dried powder of the same salt. It is then carefully decanted and distilled off *in vacuo*. The dry residue is dissolved in absolute EtOH, and filtered into a tared capsule. On evaporating off the solvent, the weight of the total hæmapheic pigments is obtained. This residue is then extracted with $CHCl_3$, which removes the urobilin. This is always present in less quantity than another pigment of a fine red colour, which does not give a fluorescence with the zinc acetate test. Too much importance should not be attached to this fluorescence test, since it is often given by the urine of perfectly healthy persons. In fact urobilin is only one of several hæmapheic pigments, and its presence is considered by the author to be of but little significance.

Urine Testing, Belloste's Reagent for. A. Butenko. (*Pharm. Zentralh.*, 1910, **51,** 831.) The reagent is a 1 : 10 solution of $HgNO_3$ containing a little free HNO_3 and metallic Hg. When 5 to 10 c.c. of normal urine is treated with 5 or 10 drops of this, and boiled, a white precipitate is obtained. In the presence of certain pathological constituents, however, the colour will be grey, due to reduction. J. Jefimow has shown that the reaction is invariably obtained when there are intestinal parasites. The author finds that the reaction was given in about 90 per cent. of the cases of progressive paralysis examined.

Water, Bacteriology of, its Present Position. P. T. Frankland. (*J.S.C.I.*, 1911, **30,** 319.) A valuable summary of the subject, including a review, of methods of procedure and the interpretation of results. The original paper should be used

COLOURING MATTERS

Bixin. A. Heiduschka and H. Riffart. (*Archiv. Pharm.*, 1911, **249,** 43.) The authors cannot sustain the formula of Van Hasselt (*Y.B.*, **1910,** 55), $C_{29}H_{34}O_5$, for bixin, but confirm that of Ette, $C_{28}H_{34}O_5$. The pure substance was obtained by extracting dry annatto paste with $CHCl_3$, crystallizing from boiling glacial acetic acid, and washing with acetone, EtOH and Et_2O. Bixin thus obtained formed violet red needles, m.p. 188°C., sparingly soluble in most solvents. The authors obtain the bromobixin of Van Hasselt, also a more highly brominated product, $C_{28}H_{34}O_5Br_{10}\cdot 4HBr$, a white powder, m.p. 143, by brominating bixin in $CHCl_3$ solution. A similar chloro-compound results with Cl. Norbixin similarly treated gives the compound $C_{27}H_{32}O_5Cl_{10}\cdot 4HCl$, m.p. 102°C.

Caramel, Spirit and Vinegar-soluble, Preparation of. A. Herzfeld. (*Deutsche. Zuckerind.*, **1910, 35,** 617; *J.S.C.I.*, 1910, **29,** 1072.) On heating dry sucrose to 180–190°C. in the manner, prescribed by Ehrlich for the preparation of saccharane (*Y.B.*, **1910,** 58) it was found that whether this is done *in vacuo*, in an atmosphere of carbon dioxide, or with the addition of fixed alkali the resulting product is always insoluble in strong alcohol. Lævulose, when heated under the same conditions, yields a caramel soluble in 80 per cent. alcohol, but this alcoholic solution gives a heavy deposit on being cooled to −8°C. The product from dextrose is very readily soluble in 80 per cent. alcohol, and its alcoholic solution on being cooled becomes but slightly turbid. Therefore to obtain a spirit-soluble caramel from sucrose, inversion must always precede caramelization, and from subsequent experiments the conclusion was drawn that the formation of the body producing the turbidity in alcohol at low temperatures is due, not only to incomplete inversion, but also to the influence of the acids which are always formed on heating the inverted solution. Accordingly an 80 per cent. solution of invert sugar contained in a glass flask was heated in an oil-bath to boiling point, then AmOH dropped in whilst the water gradually evaporated, after which the temperature was raised to 170–180°C. The caramel thus made is almost tasteless, dissolves readily in 80 per cent. alcohol, and solutions of it in strong spirit and in lager beer remain quite clear on being kept at low temperatures (−8°C.). Its solution does not alter in intensity of colour on being acidified

with acetic acid, nor does it give a precipitate with lead acetate. A 0·5 per cent. solution gives in the Stammer colorimeter a value of 100° as compared with 53° for the best commercial products.

Caramel, Standard Colour Solution of. G. A. Menge. (*Amer. J. Pharm.*, 1911, **83**, 113.) Dilute 2 c.c. of pure H_2SO_4, sp. gr. 1·84, to 12 c.c. with water. To 0·5 Gm. of sugar in a test tube, add 5 c.c. of this dilute acid and heat in the boiling water-bath for 5 minutes, with constant agitation. Then immediately add a little cold water, followed by 35 c.c. of 1 : 20 KOH solution. Finally dilute to 100 c.c.

Caramel, Test for Presence of. G. H. P. Lichthardt. (*J. Ind. Eng. Chem.*, 1910, **2**, 389.) A solution of 1 Gm. of tannic acid and 0·75 Gm. of H_2SO_4 (1·84 sp. gr.) in 50 c.c. of water, is recommended as a reagent for detecting caramel in flavouring extracts, alcoholic liquids and vinegar. In testing vanilla extract, 5 c.c. of the reagent is added to 5 c.c. of the extract, the mixture gently heated, until the precipitate at first formed is almost all dissolved. The mixture is allowed to stand for 12 hours. If caramel be present, brown precipitate is formed. The pure extract gives only a very slight precipitate, quite distinct in character. In testing alcoholic liquids, the greater part of the alcohol should be evaporated, water added, and the liquid then tested. (See also *Y.B.*, **1909**, 24.)

Carthamine. T. Kametaka and A. G. Perkin. (*Proc. Chem. Soc.*, 1910, **26**, 181.) It has been suggested that carthamine, the colouring matter of safflower, possesses the formula $C_{15}H_{14}O_7$, rather than $C_{14}H_{16}O_7$, originally assigned to it by Schlieper, but further experiment now indicates that the much higher formula, $C_{25}H_{24}O_{12}$, is most probably correct. Carthamine, when dried in the air, crystallizes with $2H_2O$, gives with dilute alcoholic potassium acetate the salt $C_{25}H_{23}O_{12}K$, in green, iridescent needles, and an amorphous benzoyl compound, probably $C_{25}H_{17}O_{12}(C_7H_5O)_7$, melting at 230–232° C., has been obtained. Although Schlieper obtained a yellow substance, $C_{14}H_{14}O_9$, by boiling carthamine with alcohol, and Radcliffe noticed a similar decomposition, experiment has failed to reproduce this. When carthamine is boiled with alcoholic aniline it gives a substance, $C_{25}H_{24}O_{12}{\cdot}C_6H_7N$, long yellow needles, melting and decomposing at 276–278°C., soluble in alkalies with a yellow

colour, and for which the name *aniline xanthocarthaminate* is proposed.

Escobedia scabrifolia and E. linearis Roots, Colouring Principle from. C. Liebermann. (*Berichte*, 1911, **44,** 850.) The roots of these two plants are used in Paraguay for colouring dietetic fats, under the names "*azafran*" or "*azafranillo.*" The colouring principle, azafrin, is extracted by C_6H_6, from which it crystallizes in warty aggregated groups of needles, m.p. about 214°C. Its formula has not yet been determined.

Quercitrin. C. W. Moore. (*Proc. Chem. Soc.*, **26,** 182.) Quercitrin is usually stated to possess the formula $C_{21}H_{22}O_{12}$, and its hydrolysis, with the formation of quercetin and rhamnose, has therefore been represented as follows: $C_{21}H_{22}O_{12} + H_2O = C_{15}H_{10}O_7 + C_6H_{14}O_7$. It is evident, however, that this equation cannot be correct, inasmuch as it is now known that rhamnose possesses the formula $C_6H_{12}O_5$, but that it crystallizes with one molecule of water. According to Brauns, quercitrin possesses the formula $C_{21}H_{20}O_{11}$, $2H_2O$, and its hydrolysis would therefore take place quite normally by the absorption of one molecule of water as follows: $C_{21}H_{20}O_{11} + H_2O = C_{15}H_{10}O_7 + C_6H_{12}O_5$. The author has confirmed the correctness of Braun's formula.

The melting-points of carefully purified quercitrin have likewise been observed to differ considerably from those recorded in the literature. It has, for example, been stated (compare Brauns, *Archiv. Pharm.*) that the air-dried glucoside melts at 174–176°, and the anhydhous substance at 168°C. The correct melting points are, however, 183–185°C. and 250–252°C., respectively. The $[a]_D$ of the air-dry glucoside is $-140{\cdot}9$.

If to an alcoholic solution of quercitrin an excess of sodium ethoxide be added, a trisodium derivative, $C_{21}H_{17}O_{11}Na_3$ is precipitated. This forms a dark yellow powder, sparingly soluble in cold alcohol.

Attempts to prepare the corresponding methyl derivative from the sodium derivative were unsuccessful, as were also those to obtain a crystalline acetyl or benzoyl derivative of quercitrin.

Thuyorhodin, a New Colouring Matter from Certain Conifers. — Tsvett. (*Comptes rend.*, 1911, **152,** 788.) The

change of colour observed in winter in the leaves of *Thuja orientalis* and of *Cryptomeria japonica* is due to the formation of a red pigment ; and not, as formerly supposed, to the modification of the chlorophyll, resulting in the formation of brown chlorophyllane. The new colouring matter has been isolated, and named *thuyorhodin*. Its absorption spectra are distinctive, the solution in CS_2 giving four marked bands. This solution is deep red in colour ; that in alcohol is pink, and that in petroleum ether yellow. Thuyorhodin is coloured indigo blue by H_2SO_4 and is not affected by alkalies. Besides its occurrence in the above mentioned reddened leaves, it also occurs in the green leaves of *Cupressus naitnocki*, *Retinospora plumosa*, *Juniperus virginiaca*, and *Taxus baccata*.

ESSENTIAL OILS

Allium cepa, Essential Oil of. W. Kooper. (*Zeits. Untersuch Nahr. Genusmitt.* ; *Schimmels' Report*, Oct., **1910,** 89.) Sulphocyanic acid, sulphocyanallyl, but no formaldehyde, acetaldehyde nor acrolein, are present in onion oil.

Alpinia galanga, Essential Oil of. A. J. Ultée. (*Schimmels' Report*, Oct., **1910,** 148.) This oil, distilled in Java, was lemon yellow and had a powerful aromatic odour : sp. gr. 0·9847 ; $\alpha_D + 4°20'$; $\eta_{D20°}$ 1,51638 ; acid value, 1·8 ; ester value, 145·6 ; soluble 1 : 1 in alcohol 80 per cent. It contains pinene cineol, camphor and methyl cinnamate ; the ester number is equivalent to 42 per cent. of the last.

Angelica, Essential Oil from Various Parts of Plant. (*Schimmels' Report*, April, 1911.) The oil distilled from the leaves has characters very similar to that obtained from the root. A table is given showing this. The oil from the fruits, however, has quite distinct characters. (See also *Y.B.*, **1907,** 17 ; **1908,** 14.)

Angelica Root, New Constituent of the Essential Oil of. E. Boecker and A. Hahn. (*J. prakt. Chem.*, 1911, **83,** 243.) The last runnings of the distillation of a large quantity of angelica root set aside for several weeks, showed a solid separation. This was crystallized from petroleum ether when it melted at 83°C. It has the composition $C_{15}H_{16}O_3$, and is a γ-lactone.

Anise-like Essential Oil from Malagasy Plant. E. Heckel. (*Comptes rend.*, 1911, **152,** 565.) All parts of a Malagasy plant, probably *Pelea madagascarica*, yield an essential oil with an anise-like odour, but the fruits give most, as much as 4 to 5 per cent. This has the sp. gr. 0·953 at 15°C.; $[a]_D + 32°22'$; $\eta_{D22°}$ 1,51469; soluble 1 : 4 in EtOH 80 per cent.; does not congeal at −18°C. It contains but little anethol; the greater part consists of aldehydes, mainly anise-aldehyde in all probability.

Balan Oil from Java. (*Schimmels' Report*, April, **1911,** 123.) The oil is from a shrub of unknown botanical source, which is used by the natives as an anthelmintic. It yields about 0·05 per cent. of a brown oil with an odour resembling that of bitter orange; sp. gr. 0·9042 at 15°C.; $\eta_{D20°}$ 1,47715; acid value, 13; ester value, 20·5. It contains an aldehydic substance forming a solid compound with $NaHSO_3$, possibly decyclic aldehyde with other aldehydes.

Bay (Myrcia acris), Essential Oil of. (*Evans' Analyt. Notes*, 12.) The quality of this oil shows a tendency to deterioration, out of twelve samples reported on, five were adulterated; some being mixtures with spike lavender and eugenol. (See also *Y.B.*, **1910,** 59.)

Bergamot, Essential Oil of, Detection of Glyceryl Acetate and other Added Esters as Adulterants in. (*Schimmels' Report*, Oct., **1910,** 61.) *Glyceryl acetate.*—Ten c.c. bergamot oil is mixed in a separating funnel with 10 c.c. light petroleum and 2·5 c.c. alcohol, and vigorously shaken up with 20 c.c. water. The addition of light petroleum and alcohol causes a very rapid separation of the oil and the aqueous liquid, so that the latter can be filtered off when the mixture has been allowed to settle for about 10 minutes. Of the filtrate 10 c.c. is neutralized with potash liquor and saponified on the water-bath for 1 hour with 5 c.c. N/2 KOH solution. In the case of pure bergamot oil, the 10 c.c. of filtrate required for saponification 0,08 c.c. N/2 KOH = 2·2 mg. KOH. After adding 1 per cent. glyceryl triacetate, 0·58 c.c. = 16·2 mg. KOH was used. After adding $2\frac{1}{2}$ per cent. glyceryl triacetate, 1·43 c.c. = 40·0 mg. KOH was used. After adding 5 per cent. glyceryl triacetate, 2·79 c.c. = 78·0 mg. KOH was used. Hence the addition of 1 per cent. glyceryl triacetate requires about 14 mg. KOH more.

Terpinyl Acetate.—This may be detected by the fact that it takes much longer to saponify than linalyl acetate. With genuine bergamot oil the process is complete in 30 minutes, but with terpinyl acetate much longer is required. Thus the ester number of a bergamot oil was 97·3 after 30 minutes, and 97·8 in 1 hour; with 5 per cent. of terpinyl acetate added it was 101·2 in 30 minutes and 104·7 in 1 hour. For the difference between the two values an inference as to the amount of adulterant may also be drawn.

The addition of the higher ethyl esters, such as succinate, oxalate and citrate may be detected by the slight volatility of the acids liberated after saponification. The acid and ester numbers are determined in the usual manner with 1·5 to 2·0 Gm. of the oil; the contents of the saponification flask are then evaporated to dryness after adding a few drops of N/2 KOH solution. The dry residue is taken up in about 5 c.c. of water and acidified with 2 c.c. of dilute H_2SO_4. A current of steam is then blown through for 30 minutes, the upper portion of the apparatus being fitted with a splash-trap, until first 250 c.c. of aqueous distillate has been collected, then another 100 c.c. is collected separately, the contents of the original flask not being allowed to exceed 10 c.c. by its being kept heated with a small bunsen. The distillate is then titrated with N/10 alkali and phenolphthalein indicator. Almost all the acids of normal bergamot oil will be in the first 250 c.c. distilled; the second 100 c.c. will not require more than 0·2 c.c. of N/10 KOH. From the quantity of KOH required to neutralize the entire distillate the acid number of the volatile acids in the oil is obtained; the difference between the saponification value of the original oil and that calculated from the volatile acids should not vary greatly between 5·2 and 6·9, any greater difference points to adulteration due to presence of non-volatile acids. Figures are given illustrating these results, with the esters themselves and with mixtures in bergamot oil. Thus with 1 per cent. of triethyl citrate the difference between the saponification value of the oil and that of the volatile acids is 11·4, with 1 per cent. of diethyl oxalate 11·9. Obviously the esters of acetic and of allied volatile acid cannot be detected by this test.

Bergamot, Essential Oil of, New Adulterant. E. J. Parry. (*Perfumery Record*, 1911, **2**, 59.) A compounded oil, offered commercially as an adulterant of genuine bergamot oil, is

reported on. It is a greenish-brown, fragrant product, not exactly resembling bergamot in odour, but when mixed with an equal volume of the pure oil, the mixture afforded an excellent imitation of the genuine oil. It had the following characters: Sp. gr. 0·8885 at 15°C.; $_{D}$ + 36; η_D25° 1,4720; apparent ester value, 40 per cent.; fixed residue, 6·2 per cent. The residue was a pale yellow viscous liquid, totally different from the waxy residue of bergamot oil. Its saponification value was 240; it therefore consists of non-volatile esters of the ethyl citrate type. The amount of acetic acid liberated by saponification of the oil was found to be 3 per cent., equivalent to 9·8 per cent. of linalyl or terpinyl acetate; as against the above named 40 per cent. of "apparent" esters. The determination of the amount of acetic acid actually present affords useful data in the examination of oil of bergamot. The refractive index of the mixture is higher than that of genuine bergamot oil. But that of the residual 10 per cent. on evaporation is only 1,4920. With pure bergamot oil this portion has the η_D not below 1,5080. From the above data, and the results of fractional distillation, the adulterant appears to be a mixture of limonene, linalol, terpinyl acetate, and a high boiling ester of the ethyl citrate type. It is being manufactured in Paris, and is being offered for sale in the bergamot producing districts of Italy.

Cajuput Oil, Australian. R. C. Cowley. (*Chem. and Drugg.*, 1910, **76,** 832.) Several species of *Melaleuca* occur on the Queensland coast, and in the neighbourhood of Brisbane *Melaleuca leucadendron*, var. *lancifolia*, known as the "Ti" tree, is fairly common. It yields an essential oil with the characteristic cajuput odour; sp. gr. 0·922; α_D −3°; η_D1, 4623; cineol content 45 per cent. If contact with copper be avoided during distillation, the oil is almost colourless.

Cajuput Oil, Cineol Determination in. (*Evans' Analyt. Notes*, **1910,** 17.) The resorcinol method for the determination of cineol is found to be valueless. (See also *Y.B.*, **1908,** 52, 53, 77.)

Camphor Wood, False, Essential Oil of. F. W. Semmler and B. Zaar. (*Berichte*, 1911.) The oil obtained from this botanically undetermined wood is pale yellow; sp. gr. 0·958 at 15°C.; soluble 1 : 2·5 in alcohol 70 per cent. It contains dextro-limonene, cineol, a monocyclic aldehyde, $C_{10}H_{14}O$, which

is identical with perilla-aldehyde and myrtenal, a bicyclic aldehyde. This is the first record of myrtenal as a natural constituent of an essential oil.

Cananga Oil, Javan ; Nerol and Farnesol in. F. Elze. (*Chem. Zeit.*, 1910, **34,** 857.) Nerol and farnesol are found to be constituents of cananga oil. The former alcohol was obtained by saponifying the geraniol fraction and refractionating *in vacuo*. The primary alcohols were converted into their phthalic acid esters and treated with calcium chloride to remove the geraniol. There is about 0·2 per cent. present. The high-boiling portion of the oil was saponified and fractionated under reduced pressure. The portion distilling between 130° and 160°C. at 3 mm. was purified by means of phthalic anhydride. A primary, unsaturated, aliphatic, sesquiterpene alcohol was thus obtained, identical with the farnesol found by Haarmann and Reimer in the oil of acacia (cassie flowers). Nerol has been found in bergamot, cananga, myrtle, champaca and Spanish wormwood oils. Farnesol occurs in Peru balsam, Tolu balsam and palmarosa oil.

Cassia Oil, Determination of Cinnamic Aldehyde in. C. F. Yates. (*Perfumery Record*, 1910, **1,** 171.) Instead of measuring the volume of nonaldehydes in the Hirschsohn flask, the author proposes to weigh them, claiming that this is easier and quicker. A weighed or measured quantity of oil is heated with strong bisulphite solution until the curd is dissolved (over a bunsen this soon takes place), then, on cooling, the undissolved portion is dissolved in Et_2O, separated from the bisulphite solution, washed once with water, separated again, dried with anhydrous Na_2SO_4, and filtered into a weighed flask. The filter paper is washed with Et_2O, after which the Et_2O is distilled off. The residue in flask is easily dried by putting a vacuum on the flask while immersed in hot water. From the weight of residue the percentage of aldehyde is calculated.

Chamæcyparis lawsonii, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 144.) This conifer has yielded about 1 per cent. of a yellow oil, resembling savin or cypress oil in odour, sp. gr. 0·9308 ; $\alpha_D + 23°48'$; η_{D20} 1,48844 ; acid value 3·7 ; ester value, 61·6 ; acetyl value, 78·8 ; soluble 2 : 1 in alcohol 90 per cent., turbid with more. It contains a small quantity of an aldehyde, possibly lauric aldehyde.

Cineol, Determination of, by the Resorcinol Method. C. E. Sage. (*Perfumery Record*, 1910, **1**, 194.) The author considers that this method gives unduly high results. (See *Y.B.*, **1908,** 52, 53, 77; also *ante*, 60.)

Cinnamon Bark, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 35.) The opinion expressed by English chemists and distillers that genuine cinnamon bark oil may range from 0·994 to 1·022 and have a corresponding low cinnamic aldehyde content, is attributed to the fact that the art of distilling cinnamon bark is not yet quite understood in Ceylon, nor, in certain quarters at any rate, in England. The low aldehyde content of the English oils is due to inappropriate management of the distillation, and the use of apparatus which is unsuited to this exceedingly difficult process. In this manner the aldehyde contained in the bark is oxidized and consequently lost to the oil. It is contended that these oils cannot be regarded as normal. The statement is strongly reiterated that "normal" cinnamon bark oil has the sp. gr. 1·023 to 1·040 and the aldehyde content of 65 to 76 per cent. (See *Y.B.*, **1904,** 58; **1907,** 40; **1908,** 53; **1909,** 25, 26; **1910,** 66, 71, 76, 78, 79, 376.)

Cinnamon Bark, Seychelles, Essential Oil of. J. Meyer. (*Arbb. Kais. Gesund-Amt.*, 1911, **36,** 372; *Chem. Zentralb.*, 1911, **1,** 1314.) In the course of a chemical and histological dissertation on Seychelles cinnamon bark, compared with Ceylon cinnamon and other known cinnamons and cassias, the yield of oil from the first-named is stated to be approximately 0·96 per cent. It contains between 60 and 72·6 per cent. of cinnamic aldehyde, and from 14·5 to 17·3 per cent. of eugenol.

Cinnamon Oil. (*Evans' Analyt. Report*, **1910,** 22.) Prominent English and German distillers have recently been in dispute as to the real aldehyde standard for normal oils. The latter contend that the high aldehyhe content of their oils is due to special precautions in distillation, whereby spontaneous oxidation of the aldehyde is minimized; whereas the former state that their methods, yielding a product poorer in cinnamic aldehyde, give the most aromatic and normal oil. It is, however, quite agreed that the value of the flavour depends chiefly on the non-aldehyde constituents, and these obviously are in highest proportion in English and (Ceylon) distilled oils. German methods will, of course, give the higher yield.

The finest imported oils have had the following values : Sp. gr. 1·020 to 1·030 ; α_D −0·5° to −1° ; aldehyde, 60 to 75 per cent. Three commercial oils were examined with an unduly high phenol content, although leaf oil was absent, viz :—

Sp. gr.	α_D	Phenols.	Aldehyde.	Ref. Ind.
1·0226	−1°	24%	76%	1·5844
1·0235	−0° 45′	20%	80%	1·5854
1·0262	−1° 10′	17%	75%	1·5845

It is interesting to note that as far as bacteriological evidence goes, leaf oils, with their higher phenol content, are more strongly antiseptic than bark oils.

Cinnamomum glanduliferum as a Source of Camphor. R. S. Pearson. (*Schimmels' Report*, Oct., **1910,** 145.) The leaves of this tree, a native of the South Himalayas, yield a camphor which is probably identical with the commercial article. It melted at 176° and had the $[\alpha]_D$ + 46·32° in alcohol. It contained no borneol or other acetylizable alcohol ; it consists solely of dextro-camphor.

Cinnamomum mindanænse. R. F. Bacon. (*Philipp. J. of Sci.*, **1910,** 257 ; *Schimmels' Report*, April, **1911.**) This tree is plentiful in the neighbourhood of Mindanao. The bark yields 0·4 per cent. of oil, sp. gr. $0{\cdot}960\,\frac{30^\circ}{30^\circ}$; $\alpha_{D\,30^\circ}$ 7·9° (+ ?) ; γ_D 1,5300 It contains about 60 per cent. of aldehydes.

Cinnamomum parthenoxylon, Essential Oil of. (*Schimmels' Report*, April, **1911**, 43.) The wood known in Java as Selasian wood yields a small quantity of oil ; sp. gr. 1·0799 ; α_D + 1°22′ ; γ_D 1,53229. Safrol is the main constituent. The bark contains no oil.

Copaiba, Essential Oil of, from Various Kinds of Oleoresin. (*Evans' Analyt. Notes*, **1910,** 26.) Forty-one samples were examined during the year, many being direct imports. The physical properties of the oils therefrom are detailed below.

Essential Oil of Bahia Copaiba—

	1	2	3	4	5	6
Sp. gr..	0·898	0·899	0·900	0·900	0·902	0·902
α_D . .	−11°	−11°26′	−10°32′	−10°30′	−8°30′	−8°0′
Yield .	44%	60%	46%	54%	56%	54%

Sample (1) was a consignment *via* New York. Sample (2) was a direct import of undoubted purity.

This balsam has at times an acid value as low as 49·7.

Essential Oil of Carthagena Copaiba—

Sp. gr.	α_D	Yield %.	Sp. gr.	α_D	Yield %.
0·894	−19°30′	40	0·903	−6°0′	52
0·8972	−19°30′	50	0·904	−2°30′	45
0·899	−22°30′	40	0·905	−7°30′	45
0·901	− 7°30′	45	0·905	−10°30′	50

The abnormally low α_D of several of these oils indicates probably some change in the botanical source, with possibly a wider collection than in former years, no adulteration being detected. Some samples contained from 1·2 to 10 per cent. of admixed water.

Essential Oil of Maracaibo Copaiba—

Sp. gr. 0·900; α_D −6°; yield, 48 per cent.

Essential Oil of Maranham Copaiba—

Sp. gr.	α_D	Yield %.	Sp. gr.	α_D	Yield %.
0·896	−18°30′	36	0·900	−14°30′	40
0·899	−18°30′	45	0·9005	16°	40
0·899	−19°0′	43	0·901	−16°	45
0·8995	−15°30′	45	0·901	−13°20′	56
0·900	−13°30′	48	0·9016	−12°18′	50
0·900	−14°0′	52	0·902	−13°30′	50

This balsam has been very constant in character this season, the α_D of the oil being nearer its normal value, as contrasted with its variability last year.

One sample of Maranham balsam which gave some indication of fixed oil, by its action with KOH and its incomplete solubility in $EtOH_1$ had an acid value of 67·2. The acid value of the resin after prolonged heating and evaporation of the oil was only 89; no indications of fixed oil could, however, be obtained with the U.S.P. test (2 minutes saponification with 10 per cent. alcoholic KOH—no gelatinization with ether).

Essential Oil of Para Copaiba—

Sp. gr.	α_D	Yield %.	Sp. gr.	α_D	Yield %.
0·886	—29°0′	52	0·8916	—27°30′	50
0·891	—25°12′	50	0·8965	—17°30′	60
0·891	—24°0′	50	0·897	—21°30′	70
0·891	—23°0′	45	0·897	—18°44′	64
0·8912	—24°14′	50	0·906	—30°0′	64
0·8915	—24°30′	50	0·908	—29°0′	72

This balsam maintains its abnormal characters noticed last year, the oils being characterized by low sp. gr. and high α_D. In no sample throughout the year was Gurjun or African balsam detected. The figures obtained confirm the results of Hill and Umney. (See *Y.B.*, **1904,** 68; **1907,** 49; **1908,** 57, 58; **1909,** 28.)

Copaiba Oil, Terpene of. E. Deussen and A. Hahn. (*Chem. Zeit.*, 1910, **34,** 873.) The terpene α-carophyllene has been detected in copaiba oil.

Copal, Manila, Essential Oil of. G. F. Richmond and B. T. Brooks. (*Philipp. J. Sci.*, 1910, **5,** 185, 203; *Schimmels' Report*, April, **1911,** 55.) Steam distillation yields 6 per cent. of fragrant yellow oil, sp. gr. 0·865 50° 4° C.; $\alpha_{D30°}$ —26·55°; $\eta_{D30°}$ 1,4648. It contains dextro-lemonene, dextro-α-pinene, β-pinene, camphene, and probably dipentene.

Cubeb Oil, Action of, on Alkali Metals. (*Haensel's Report*, Sept., 1910; *Chem. Zentralh.*, 1910, **2,** 1538.) Bright metallic K or Na when immersed in freshly distilled cubeb oil remain untarnished. In oil which has been kept for some time, the bright surface soon becomes coated with a deposit.

Dacrydium franklinii, Wood, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 145.) This conifer is known in Victoria as the Huon tree. The wood, distilled in Melbourne, yielded a pale yellow oil with the odour of methyl-eugenol, which proved to be its main constituent. Sp. gr. 1·0443; α_D + 0°6′; $\eta_{D20°}$ 1,53287; acid value, 0·9; ester value, 1·5; soluble 1 : 5·2 of alcohol 60 per cent. There is also a little eugenol present.

Dehydrodicarvacrol. H. Cousin and H. Hérissey. (*J. Pharm. Chim.*, 1910, **2,** 49.) This substance, $C_{20}H_{26}O_2$, is obtained in colourless, extremely light, felted needles, m.p. 165–

166°C. when an hydrous, by allowing a saturated aqueous solution of carvacrol to stand in contact with a dilute solution of Fe_2Cl_6 for 10 or 12 days at 15–18°C. The crystalline precipitate which slowly forms is collected, dissolved with a very dilute solution of NaOH, filtered, and the filtrate acidified with acetic acid. The dehydrodicarvacrol liberated is collected, washed, dried, and recrystallized from alcohol.

Essential Oils, Bactericidal Power of. W. H. Martindale. (*Perf. Record*, 1910, **1**, 266.) The results of a large number of experiments employing a modification of the *Lancet* method for determining the "carbolic acid coefficient" are summarized in the table on p. 67.

Origanum oil is there shown to be 25·76 times as powerful as the same weight of absolute phenol under the conditions of the test. It is noticeable that carvacrol and thymol bodies dispute the premier position in the table. The fact that geraniol beats the cinnamon oils is interesting, as also that it has a value one and a half times that of the closely allied citronellol. Both geraniol and citronellol come out better than "otto." In cinnamon leaf oil and clove oil there are high eugenol contents as also fairly high carbolic acid co-efficients. The position of the two oils is not concordant with the phenol content. Clove oil is well known as an antiseptic, and cinnamon leaf oil, containing almost the same proportion of very similar constituents, approximates it in antiseptic power, while "leaf oil" is more antiseptic than the higher valued (commercially) bark oils. With regard to the cinnamon bark oils, the 52 per cent. aldehyde oil takes a higher place than the 82 per cent. quality. Cinnamic aldehyde itself comes lower still in the table, indicating that the total antiseptic value of cinnamon oils is not entirely attributable to it. Viewing the contents of the cassia oil in aldehyde, the result is comparable with that of the pure aldehyde. It is noticeable that the two isomeric phenols which rank highest in the table have almost the highest molecular weights of those occurring in the commoner essential oils. With reference to the eucalyptus oils, it has been shown that the antiseptic power of eucalyptol is less than that of all the other constituents of eucalyptus oil, and is exceeded by phellandrene, and piperitone, and the results obtained support this view. As the action of eucalyptus oil is generally considered due to antiseptic power, it would seem desirable not to exclude oils rich in phellandrene.

Essential Oil Dilution.	C.A. Co-efficient at 2 mins.	C.A. Co-efficient at 30 mins.	C.A. Coefficient.
Origanum, 82 per cent. phenols (aqueous)	28 (mean of 3 experiments)	23·53	25·76
Thymol (in saponaceous solution)	30	20·58	25·29
Carvacrol	25	17·64 (Mean of 2 results)	21·32
Thymol (in aqueous solution)	20	18·82	19·41
Thyme, 46 per cent. phenols (in soap)	15	14·7	14·85
Thyme (aqueous) . . .	15	11·76	13·38
Geraniol (in soap) . . .	14	10·58	12·29
Cinnam. Leaf, 86 per cent. phenols (in soap)	10·5	8·82	9·66
Cinnamon Bark, 52 per cent. aldehyde (in soap)	9 (Mean of 2 results)	8·82	8·91
Cloves, 90 per cent. eugenol (in soap)	11	6·76 (Mean of 2 results)	8·88
Cinnamic aldehyde (in soap)	9	7·0588	8·029
Citronellol (in soap). . .	8·0 (2 expts.)	8·235	8·117
Cinnamon Bark, 82 per cent. aldehyde (in soap)	8·5 (Mean of 2 results)	7·35 (Mean of 2 results)	7·925
Cinnamon ditto (in water)	8·33 (Mean of 3 results)	5·88 (Mean of 3 results)	7·105
Rosemary	6	5·88	5·94
Otto of Rose, 68 per cent. alcohols (in soap)	6	5·88	5·94
Cassia, 85 per cent. aldehyde (in soap)	6	4·7	5·35
Wintergreen (in soap) . .	4 (approx.)	5·29	4·64
Eucalypt. Amygd. (in soap)	4	4·7 (Mean of 2 results)	4·35
Lavender, English (in soap)	4	5·88	4·94
Lemon (in soap)	2	5·88	3·94
Almond, Essential, s.A.P. (in soap)	4	3·53	3·76
Eucalyptol (in soap) . .	4	3·53	3·76
Eucalypt. Glob., 67 per cent. cineol	3	4·117	3·55
Light Oil of Tar (rectified).	2	2·35	2·175
Sandalwood, 93 per cent. santalol	1	2·35	1·67
Birch Tar Oil	1	2·35	1·67
Cade Oil	<1	<1	<1

Essential Oils, Detection of Added Glyceryl Acetate to. (*Schimmels' Report*, April, **1911**, 150.) Ten c.c. of the oil is shaken up with 20 c.c. of 5 per cent. alcohol. After separation, the alcohol layer is separated and filtered. Ten c.c. of the filtrate is neutralized to phenolphthalein and saponified for 1 hour with N/2

KOH. With pure oils the amount of N/2 KOH used up does not exceed 0·1 c.c.

Essential Oils, Determination of, in Spices. J. A. Brown. (*Analyst*, 1910, **35,** 392.) The method consists in heating small quantities of the spice in a bent tube in an air oven to a suitable temperature, in a current of dry air, free from CO_2; and conducting this, after passage over the heated spice, through a combustion tube of CuO as in the ordinary method of ultimate organic analysis. The "volatile carbon" thus obtained gives the required data for calculation. Two spices, cinnamon and caraway, have been experimented with by this method. Cinnamon oil is taken as containing 80 per cent., and caraway 81 per cent., of C. In the case of cinnamon the temperature in the air-bath is kept at 150–160°C.; and for caraway at 130–140°. The results obtained are comparable with those obtained by the author and Cripps' modification (*Analyst*, 1909, **34,** 519) of Duprè's acetylene method for the determination of moisture and essential oil in spices.

Essential Oils of the B.P., Suggested Characters for. C. A. Hill and J. C. Umney. (*Perfum. Record*, 1910, **1,** 227.) The authors now publish the suggested characters for the official essential oils. These have, as far as possible, been amended so as to bring them in accord with the expressed views of those who have published data on the subject, which it was the purpose of the original paper (*Y.B.*, **1910,** 70) to elicit. The authors urge the inclusion of the refractive index among the characters to be given in the next edition of the official work. The amended characters put forward are summarized below.

Oleum Anethi.—Sp. gr. 0·900 to 0·915 and a_D + 70° to + 80°. The physical limits are practically sufficient in themselves to ensure desirable carvone percentage.

Oleum Anisi.—a_D − 2° to + 1°. The melting-point alone might be stated.

Oleum Anthemidis.—a_D −1° to + 3°.

Oleum Cajuputi.—a_D extended to −4°.

Oleum Carui.—There is no reason to lower the sp. gr. A minimum a_D + 75° accords with maximum sp. gr. 0·920.

Oleum Caryophylli.—The lower gravity oils are the more aromatic. A minimum of 85 per cent. of eugenol is recommended.

Oleum Cinnamomi.—The following characters are suggested: Sp. gr. 1·000 to 1·030; aldehyde content, 55 to 65 per cent., and refractive index from 1·565 to 1·580.

Oleum Copaibæ.—The following test should be added:—If distilled *in vacuo* the first 10 per cent. should have a less rotation than that of the original oil (absence of African copaiba).

Oleum Coriandri.—An alcoholic percentage limit has been suggested, but is not considered to be of sufficient importance to warrant inclusion.

Oleum Cubebæ.—Lower limit of sp. gr., 0·910.

Oleum Eucalypti.—The percentage of cineol should be left for decision until the therapeutic value of the substance is settled. Genuine globulus oils usually contain 55 to 65 per cent. The very high-testing Australian oils are less desirable pharmaceutically on account of the irritating aldehyde which causes coughing.

Oleum Juniperi.—The α_D might be increased to $-15°$. The η_D of highest fractions is of decided value.

Oleum Lavandulæ.—A minimum percentage (30) of ester is suggested.

Oleum Limonis.—For the determination of citral, the hydroxylamine method as modified by A. H. Bennett is the most suitable, although it appears to give results which are about 10 per cent. too low.

Oleum Menthæ Piperitæ.—It is not advisable to lower the α_D from $-20°$ to $-18°$ as suggested by Schimmel, nor to have an ester value of less than 5 per cent.

Oleum Myristicæ.—Five per cent. of crystallizing residue is the limit suggested. Sp. gr. 0·925 might be given as a maximum.

Oleum Pimentæ.—A sp. gr. of 1·030 to 1·050 is a suitable range, and a percentage of 60 of eugenol as a minimum is high enough.

Oleum Pini Sibericæ.—Nearly all fine oils have an ester content of over 35 per cent.

Oleum Rosæ.—The sp. gr. might be lowered to 0·854 at 30°C.

Oleum Rosmarini.—The lower limit of sp. gr. might, perhaps, be 0·895, though, as a rule, oils are over 0·903. To include all English and Spanish oils the α_D might be made from $-2°$ to $+15°$. A minimum of 1·8 per cent. of esters is desirable.

Oleum Santali.—The raising of the santalol content to 92

per cent. is not advised. An a_D of $-13°$ to $-21°$ would probably cover all views.

Oleum Sinapis.—According to Schimmel, the natural oil sometimes has a sp. gr. as low as 1·014. The authors think that the synthetic oil might be made official, as suggested by Sachsse. It is only used externally in pharmacy.

Oleum Aurantii.—The range of sp. gr., 0·847 to 0·854, and a_D + 92° to + 99°, would seem to be unobjectionable in view of slight variation from season to season.

With regard to the acetylation process, it is considered desirable that it should be carried out for 2 hours with 2 Gm. of anhydrous sodium acetate to each 10 c.c. of oil.

Essential Oils, Refractive Indices for. E. J. Parry. (*Chem. and Drugg.*, 1910, **77,** 314.) The value of the determination of the η_D of essential oils is emphasized. A series of tables of these data compiled from a number of experiments is given.

Essential Oils, Syrian. (*Roure-Bertrand's Report*, April, **1911**; *Perfumery Record*, 1911, **2,** 102.)

Origanum Oil is a pale yellow liquid depositing a translucent camphor on standing. Its characters are: Sp. gr., 0·9309; a_D + 1°6′; solubility, 1 in 1½ vols. of 80 per cent. alcohol. *Bay Oil* (probably *Laurus nobilis*): Sp. gr., 0·9161; a_D — 14°20′; solubility, 1 in 1 of 80 per cent. alcohol. *Sage Oil:* Sp. gr., 0·9843; a_D —6°8′; solubility, 1 in 1 of 80 per cent. alcohol and in 1½ vols. of 70 per cent. alcohol. *White Thyme Oil:* Sp. gr., 0·9120; a_D —0°56′; solubility, 1 in 1¼ vols. of 80 per cent. alcohol. *Neroli Oil:* Sp. gr., 0·8758; a_D +1°6′; saponification number, 51·5; esters as linalyl acetate, 18·0. *Petitgrain Oil:* Sp. gr., 0·8857; a_D —3°24′; saponification number, 77·4; esters as linalyl acetate, 27·1 per cent.

Essential Oils, Terpeneless. E. Sachsse. (*Perfumery Record*, 1911, **2,** 12.) The characters of the following terpene- or sesquiterpene-free oils are compared with those of the same oils containing their natural terpenic constituents. Angelica, Bay leaf, Calamus, Cananga, Ginger, Hop, Juniper, Myrrh, Patchouli, Pine (*Abies pectinata*, *Pinus pumilio* and *P. siberica*), and Ylang-ylang.

Essential Oils, Toxicity of, to Seedlings. H. Coupin. (*Comptes rend.*, 1911, **152,** 529.) The greater number of essential

oils have a distinctly deleterious action on growing seedlings, when these are grown in an atmosphere saturated with the vapour of these oils. Wheat plants about 2 cm. high were used in a series of experiments with different oils. They were grown under bell jars, in an oil-saturated atmosphere, sufficient air being meanwhile admitted to maintain the plants, under normal conditions, in a healthy state. The experiments were conducted for a period of 10 days. Under these conditions the following essential oils were almost at once fatal : Niaouli (*Melaleuca viridiflora*), star anise, Russian anise, French anise. The following allowed a slight growth to take place. Thyme, wild thyme, sassafras, lavender, spike lavender, absinthe, bergamot, neroli, juniper, meadowsweet, mace, tansy, and rosemary. Retarding growth and altering the seedlings somewhat were : Cédrat, verbena, cinnamon, cajuput, sweet fennel, cassia, ylang-ylang, violet, tangerine orange, coriander, hyssop, sage, chamomile, eucalyptus, rose, wintergreen, balm, green mint, American peppermint, French geranium, angelica, caraway, bitter orange. Those which merely retarded growth were : Citronella, bitter fennel, cinnamon, Calabrian orange, origanum, sandalwood, orris. The only inert oils were those of cloves, vetiver, and patchouli.

Eucalyptus, Cultivation of, in California for Oil. E. C. Binz. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 602.) At present prices California cannot compete with Australia in the production of eucalyptus oil. The material for distillation is not so plentiful, labour is dearer, and the State has not yet an established market. On the other hand, the Californian oil is distilled almost entirely from *Eucalyptus globulus*, and is therefore more uniform in quality than the Australian product, which may be distilled promiscuously from several species.

Eugenia apiculata, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 145.) The dried leaves of this Chilian drug yielded 1·27 per cent. of brown oil resembling myrtle oil in odour ; sp. gr. 0·8920 ; α_D +12°40′ ; $\eta_{D20°}$ 1,47821 ; acid value, 5·5 ; ester value, 25·8 ; acetyl value, 65·3 ; soluble 1 : 2 in alcohol 90 per cent. ; insoluble 1 : 10 in alcohol 80 per cent. The drug is known in Chili as "arrayan," and is esteemed as a remedy for diarrhœa and pulmonary affections. It contains a tannin-glucoside.

Eugenia occlusa, Essential Oil of. (*Schimmels' Report*, April, **1911**, 123.) The yield is only 0·05 per cent. of dark brown oil which shows a crystalline deposit at 120°C. It is known in Java as "Salam oil"; sp. gr. 0·9567; α_D −1°49′; $\eta_{D20°}$ 1,48614; it contains aldehydes, including some citral.

Fagara xanthoxyloides, Essential Oil of. H. Thoms. (*Chem. Zeit.*, 1910, **34**, 1279.) In addition to dipentene, linalol and cadinene, the oil from the root contains a new lactone, xanthotoxin, $C_{12}H_8O_4$, m.p. 144–145°C. It is poisonous to fish.

Gastrochilus pandurata, Essential Oil of. A. J. Ultée. (*Schimmels' Report*, Oct., **1910**, 148.) The oil distilled in Java from this Zingiberaceous plant is almost colourless; the odour resembles tarragon and basilicum oils. Sp. gr. 0·8746; α_D + 10°24′; $\eta_{D20°}$ 1,48957; acid value, 0; ester value, 17·3; not perfectly soluble in alcohol 80 per cent.

Geranium, Bourbon, Essential oil of, adulterated with Ethyl Oxalate. E. J. Parry. (*Perfumery Record*, 1911, **2**, 83.) Six samples of Bourbon geranium oil have been met with which were adulterated with ethyl oxalate. On saponifying these with alcoholic KOH, crystals of $K_2C_2O_4$ separate out, and $H_2C_2O_4$ is present in the saponification liquid when the determination is completed. These oils had the following characters: Sp. gr. at 15°C., 0·9093 to 0·9225; $\eta_{D20°}$ 1,4634 to 1,4702; apparent ester, 46 to 74 per cent.; α_D −10°35′ to −10°40′. In saponification, one part of ethyl oxalate is equivalent to nearly two parts of geranyl acetate and of more geranyl tiglate.

Gingerol identical with Perilla Alcohol. F. W. Semmler and B. Zaar. (*Berichte*, 1911, **44**, 460.) The alcohol, $C_{10}H_{16}O$, from ginger-grass oil, *Andropogon schœnanthus*, formerly known as gingerol, is now found to be identical with racemic perillæ alcohol.

Inula viscosa, Essential Oil of. (*Roure-Bertrand's Report*, April, **1911**; *Perf. Record*, 1911, **2**, 102.) The oil is a clear brown mobile liquid, with a very powerful aromatic odour, recalling that of hyssop and eucalyptus. Sp. gr. 0·9436; α_D −24°; solubility 1 in 1 of alcohol 80 per cent. with separation of crystals of paraffin. Its principal constituent appears to be cineol. The plant which yields this oil is widely distributed

in Algeria, and very abundant in the territories of the Maures and Esterel, where it is accompanied by its congener *Inula graveolens*, which has an odour recalling that of lemon.

Juniper, Essential Oil of, Constituents of. (*Schimmels' Report*, Oct., **1910,** 73.) In addition to pinene, cadinene and terpinenol–4 already recorded, camphene has been isolated from the terpene fractions of this oil.

Lavender, French, Essential Oil of, Presence of Thymol and Nerol in. F. Elze. (*Chem. Zeit.*, 1910, **34,** 1029.) The fraction boiling 85–100°C. under 5 mm. was found to contain nerol and thymol.

Lemon, Essential Oil of, Pinene Nitrosochloride Test for. E. J. Parry. (*Chem. and Drug.*, 1911, **78,** 159.) After drawing attention to flagrantly erroneous and sometimes contradictory statements published by official analysts of the U.S. Department of Agriculture, concerning the easily ascertained characters of lemon oil and allied essential oils, as indicating that caution is necessary before accepting as accurate the figures of these official analysts, the author proceeds to deal with the Chace nitrosochloride test for pinene in particular. Ten samples of lemon oil of undoubted purity were submitted to Chace's test; and also to a modification of the test in which the first 10 per cent. of distillate was allowed to stand in contact with metallic sodium for 2 hours at 50°C., and then re-distilled before applying the test. Four of the samples in the direct test and all of them in the modified test gave a positive result, although in no case were the characters of the crystals so well-defined as in the microphotographs published by Chace. It must, therefore, be concluded that a positive result in Chace's test is in no way a certain indication of adulteration. Moreover, when a sample of lemon oil is adulterated with oil of turpentine to such an extent that a copious amount of crystals of pinene nitrosochloride is obtained, such adulteration can be detected more readily and with greater certainty by the ordinary methods of analysis. (See also *Y.B.*, **1910,** 73, 83, 84, 85.)

Melaleuca trichostachya, and M. bracteata, Essential Oils of. R. T. Baker and H. G. Smith. (*Chem. and Drugg. Austral.*, 1911, **26,** 6; *Schimmels' Report*, April, **1911,** 81.) *Melaleuca trichostachya* leaves and tops yield 2·5 per cent. of oil,

colourless when rectified and containing 85 per cent. of cineol. *M. bracteata* yields about 1 per cent. of a heavy oil containing large quantities of methyleugenol and cinnamic aldehyde, as well as free and combined cinnamic acid.

Mespilodaphne pretiosa, Essential Oil of. (*Roure-Bertrand's Report*; *Perfumery Record*, 1910, **1**, 265.) The South American tree known as "prisprioca" belongs to the laurel order, and is a native of Rio Janeiro and Minas Geraes. The branches yield 0·5 per cent. of an essential oil having a cinnamon odour; sp. gr. 0·8912; $\alpha_D + 7°25'$; η_D 1,469; esters as linalyl acetate, 4·65 per cent.; alcohols as linalol, 51·8 per cent. The wood yields 0·63 per cent. of two oils, light and heavy. The light oil has the odour of lignaloe with a suggestion of cinnamic alcohol; sp. gr. 0·9531 at 15°C.; $\alpha_D + 8°48'$ η_D 1,501; esters as linalyl acetate, 35·28; alcohols as linalol, 66·6. The heavy portion had the sp. gr. 1·0551 at 15°C.; $\alpha_D + 3°8'$; η_D 1,545. It consists chiefly of linalyl or geranyl benzoate.

Mustard, Essential Oil of, Abnormal. (*Schimmels' Report*, Oct., **1910**, 81.) A distillation from the authenticated seeds of Indian mustard, *Brassica juncea*, has yielded an abnormal distillate, as shown by the following characters: Sp. gr. 0·995 at 15°C.; $\alpha_D + 0°12'$; $\eta_{D\,20°}$C., 1,51849; soluble 1 : 10 in alcohol 70 per cent. The greater bulk of the oil distilled over at above 177°C., at which temperature only a small proportion of normal oil remains undistilled. This oil contained dimethyl sulphide, allyl cyanide, about 40 per cent. of allyl isothiocyanate, and about 50 per cent. of an isomeric crotonyl mustard oil of unknown composition.

Mustard, Essential Oil of, Reactions resembling those of HCN. G. Venturoli and A. Finzi. (*Boll. Chim. farm.*, **49**, 201; *Chem. Zentralb.*, 1910, **2**, 175.) It is pointed out that allyl sulphocyanide and essential oil of mustard give reactions similar to HCN with certain reagents. In toxicological work, this should be borne in mind. Thus, a distillate containing mustard oil gave the Schoenbein reaction, also reactions common to HCN and HCNS with Fe_2Cl_6, with $AgNO_3$, with $Hg2NO_3$ and with $HgNO_3$. They consider that the Schoenbein reaction is due to HCNO derived from HCN by oxidation.

Ocimum basilicum, Varieties of, cultivated for Distillation.

(*Roure-Bertrand's Report*, Oct., **1910,** 23.) Several varieties of sweet basil are used for distillation. *Ocimum basilicum*, var. *purpurascens*, Benth., red-violet basil; the var. *thyrsiflorum*, Benth., common white basil; var. *album*, lettuce leaf basil; and var. *crispum*, Cam., curly-leaved basil, are all used. The last named is best for oil production, since it yields more. A table is given showing the characters of the oils from these different varieties. The oils contain about 55 per cent. of methyl chavicol.

Peppermint, Dried Leaves, Essential Oil of. J. Muraour. (*Bull. Soc. Chim.*, 1911, **9,** 66.) The dried leaves which fall off during the growth of the plant yield from 400 to 500 Gm. of oil from 100 kilo. This has a bright yellow colour; its odour resembles that of Japanese mint. Sp. gr. 0·911 to 0·913; α_D −38°18′ to −40°04′; esters, 33 to 40·31 per cent.: total menthol, 43·99 to 45·67 per cent. The very high proportion of esters is a notable character of this oil. The oil is not known in commerce, but is said to be used to mix off with oil distilled from the usual material.

Peppermint, Japanese, New Constituent of Oil of. (*Schimmels' Report*, Oct., **1910,** 97.) A new ketone, *Δ′*menthenone, which has not been found previously in essential oils, occurs in Japanese peppermint oil. When purified this boils at 235–237°C. (under 752 mm.); sp. gr. 0·9382 at 15°C.; α_D + 1°30′; η_D 1,48441.

Peppermint, Japanese, cultivated in Germany, Essential Oil of. H. Thoms. (*Berichte Pharm.*, 1910, 424.) An experimental crop of *Mentha arvensis*, var. *piperascens*, grown at Dahlem from plants imported from Japan, has been sufficient for two trial distillations, one in the summer, and the other in August. The yield was not very high, 0·091 per cent. on the fresh, or 0·553 per cent. on the dry material. This was due to the latter cutting being attacked by the fungus *Puccinia menthae*, which adversely affected the yield, but did not influence the quality of the oil. This had practically the normal characters of Japanese-grown peppermint oil:—Sp. gr. at 25°C.; 0·8976; congealing pt., 8°C.; $\alpha_{D,21°}$ −31·85°; acid value, 2·28; ester value, 16·2; acetyl value, 264 and 265; total menthol, 73·4 and 73·7; free menthol, 68·9 and 69·2.

Peppermint Oil, English, French and Italian. J. C. Umney. (*Pharm. J.*, 1910 [4], **31,** 731.) The superiority of English

peppermint oil having been challenged by a French expert, the author has reviewed the whole situation at length. The varieties of peppermint under cultivation here and in the countries mentioned; the area under cultivation with the crop; the diseases of the plants; methods of distillation; the relative qualities of "black" and "white" peppermint oils; the valuation of the oils; and adulteration, are all dealt with. The following colour reactions serve to distinguish French or Italian peppermint oils from Saxon or English.

(*a*) To 1 c.c. of oil in 5 c.c. of alcohol, 0·5 Gm. of sugar is added, and finally 1 c.c. of strong HCl. The mixture is heated to boiling, and left to stand for 5 minutes. Saxon, American, and English (black and white) oils give a deep blue or violet colour. Italian and French oils give a deep crimson.

(*b*) Five drops of the oil are added to 1 c.c. of glacial acetic acid, and allowed to stand 24 hours. Saxon, American, and English (black and white) oils give a pale blue or pale green colour. The Italian and French give an intense emerald green, with copper-coloured fluorescence.

The chief physical and chemical characters of the peppermint oils under notice are tabulated as follows:—

	Sp. gr.	Optical Rotation.	Total Menthol.	Esters.
			Per cent.	Per cent.
Mitcham, 1907	0·906	—	67·4	7·8
Mitcham, 1907	0·9015	—	66·2	4·5
Mitcham, 1908	0·904	—	68·2	5·6
Mitcham, 1909	0·907	—	67·2	6·1
Sutton, 1906	0·905	—	59·6	6·6
Sutton, 1907	0·906	—	60·2	6·1
Long Melford, 1908	0·908	—26	57·1	6·4
Long Melford, 1909	0·906	—30	58·9	7·8
Long Melford, 1910	0·906	—26	61·5	6·1
Elsenham	0·910	—24	58·6	6·4
Mitcham, 1910 (fire heat)	0·905	—28	68·3	7·3
Mitcham, 1910 (steam dist.)	0·9047	—28°30′	66·3	7·1
Mitcham White, 1910	0·8997	—33°30′	62·1	20·9
Mitcham White, 1908	0·903	—31	59·2	15·1
French (normal)	0·916	—9·3	52·0	6·0
French (abnormal)	0·916	—2	41·0	9·4
French (abnormal)	0·922	+2	47·8	10·7
Italian Black (crude)	0·910	—20	54·5	6·35
Italian Black (rectified)	0·909	—20	59·0	6·08
Italian White	0·907	—23	56·4	5·9
Sicilian	0·908	—14	40·0	4·8
Saxon, 1910	0·907	—26	58·2	7·86

Oils distilled from plants suffering from the cryptogamic disease known as rust or smuff are found to have the α_D markedly modified, some showing a dextro-rotation of + 2°. The flavour of peppermint oil is a most important factor in determining its value. The natural bitterness of Japanese and allied oils excludes them from comparison. The oils produced originally from the Mitcham type have many features in common. Chemical analysis shows that English oils have a certain proportion of ester and a decidedly high pungency value, as shown by the total menthol percentage. French oils have the other extreme, and in the normal types show a comparatively low total menthol with a somewhat high ester percentage. This means, therefore, that French oil is, perhaps, hardly suitable in its natural condition, at any rate, as now cultivated and produced, for the making of articles where pungency with softness is required, and the probability is that a blend of French with English oils would give the best results, or, under certain conditions, that a blend of French with American oil might be desirable. With regard to the assertion of the French authority that the area under peppermint cultivation in England cannot possibly produce the amount of oil sold as English, the author shows that the same occurs in France, even when allowing that the product of a given area may be twice as much as is obtainable in England.

Peppermint, Hungarian, Oil. K. Irk. (*Z. Riech- und Geschmackst.*, 1910, **2**, 222; *J.S.C.I.*, 1910, **29**, 1270.) The average yields is 1·17 per cent.; sp. gr. at 20·C. 0·89705 to 0·92; α_D −26·51° to −32·40°; solubility, 1 : 2 to 1 : 4 in 70 per cent. alcohol; 1 : 1 to 1 : 2 in 80 per cent. alcohol; saponification value, 19·6 to 45·99; menthol ester, 5·46 to 12·82 per cent.; acetyl value, 173·0 to 199·6; free menthol, 42·815 to 55·90 per cent.; total menthol, 55·38 to 65·19 per cent.; menthone, 7·38 to 13·21 per cent.

Perilla, Essential Oil of. F. W. Semmler and B. Zaar. (*Berichte*, 1911, **44**, 52.) The essential oil of the Japanese labiate, *Perilla nankinensis* (*Ocimum crispum*) contains a new aldehyde, $C_{10}H_{14}O$; b.p. 104–105°C.; sp. gr. 0·961 at 18°C. It forms the oxime, $C_{10}H_{14}:NOH$ with hydroxylamine, and this gives the nitrite $C_{10}H_{13}N$ when heated with acetic anhydride and sodium acetate. When this is saponified with alcoholic KOH, perillic

acid, $C_{10}H_{14}O_2$, is obtained, separating from dilute alcohol in crystals, m.p. 130–131°C. It forms the dibromide $C_{10}H_{14}O_2Br_2$, m.p. 166–167°C. Perilla aldehyde, when reduced with $HC_2H_3O_2$ and Zn dust, yields the corresponding perilla alcohol, $C_{10}H_{16}O$, b.p. 119–121°C.

Persea gratissima Bark, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 20.) Some years back a bark with an anise-like odour from Madagascar was distilled, yielding 3·5 per cent. of oil containing a little anethol and much methyl chavicol. The botanical source was then undetermined and it was provisionally referred to an *Illicium*. It is now identified as the bark of *Persea gratissima*, the Avocado pear, N.O. *Lauraceæ*. The leaves contain a similar oil.

Pine Oils, Australian. R. T. Baker and H. G. Smith. (*Research on Pines of Australia*; *Schimmels' Report*, April, **1911,** 17, 18, 21, 22, 25, 58, 95.) *Actinostrobus pyramidalis*.—The leaves of this West Australian conifer gave, in July, 0·256 per cent. of essential oil; sp. gr. 0·8726 at 15°C.; $a_D + 40·9°$; $\eta_{D19°}$ 1,4736; saponification value, 21·6. It contains large quantities of dextro-*a*-pinene, but no limonene. A small amount of geranyl acetate is present.

Agathis robusta.—This tree, also known as *Dammara*, *robusta*, the Queensland kauri, or "dandathu pine," yields a resin from which 11·64 per cent. of essential oil was obtained; sp. gr., 0·8629 $\frac{16°}{15°}$; $a_D + 20·2°$; $\eta_{D16°}$ 1,4766. The oil is practically all dextro-*a*-pinene and almost identical with American turpentine oil.

Araucaria cunninghamii.—This is known as "hoop," "colonial," or "Moreton Bay pine." The leaves only yield 0·005 per cent. of oil when distilled in November. It appears to consist of high boiling terpenes. The latex when distilled yielded 3·8 per cent. of oil with a slight menthene odour. Sp. gr. 0·8057 $\frac{22°}{15°}$; $a_D + 31·2°$; $\eta_{D22°}$ 1,457. After 10 months standing it deposits a menthane, $C_{10}H_{20}$, as a resinous precipitate.

Athrotaxis selaginoides.—This conifer is known in Tasmania as "King William's pine." The leaves distilled in July yielded 0·076 per cent. of essential oil: sp. gr., 0·8765 $\frac{16°}{15°}$C.; $a_D + 74·8$;

η_{D16}. 1,4905; ester value, 8·6. It consists almost entirely of dextro-limonene.

Callitris oils.—*Callitris glauca* wood resists the attacks of white ants, probably due to the presence therein of a previously unrecorded phenol, callitrol. This wood yields 0·82 per cent. of essential oil, which forms a semi-solid mass. After separating the solid portion the liquid oil had the sp. gr. 0·9854. It contains sesquiterpenes, esters and the phenol callitrol. The solid substance was proved to be guaiol, $C_{15}H_{26}O$, also found in the oil from the wood of *Callitris macleyana*, the stringy bark pine. The wood of *Callitris intratropica*, and of other species, contains so much guaiol that it appears as crystals on the cut surface of the logs. Several species of Australian *Callitris* yield resin resembling sandarac, but it is not at present collected. *Callitris robusta* leaves of Western Australia yielded 0·261 of essential oil in June, which contained dextro-*a*-pinene, dextro-bornyl acetate and geranyl acetate; limonene and dipentene were probably present in small amount.

Callitris verrucosa, the "cypress" and "turpentine pine" of New South Wales, gave from the leaves 0·331 per cent. of oil, and less in December. It contained dextro-*a*-pinene, dextro- and lævo-limonene, dipentene, small quantities of geranyl and bornyl acetates, free borneol and sesquiterpene. *Callitris propinqua*, cypress pine, leaves gave 0·41 per cent. of oil in May, closely resembling that of *C. glauca*. *C. glauca*, the "white," "cypress," and "Murray River pine," yielded from the leaves 0·5 to 0·6 per cent. of oil comparing favourably with the better grades of commercial pine needle oils. It contains dextro-*a*-pinene, dextro-limonene, dipentene, dextro-bornyl acetate and free dextro-borneol. *Callitris arenosa* is another "cypress pine." Its leaves yielded 0·249 per cent. of oil in January and 0·4 per cent. in September. It contains about 85 per cent. of dextro- and lævo-limonene and dipentene. All the *Callitris* oils distilled in the middle of summer contain more lævo-limonene than the same oils drawn in the winter.

Callitris intratropica leaves yield 0·11 per cent. of oil containing some bornyl and geranyl acetate. *C. gracilis*, "mountain pine," leaves yield 0·723 per cent. of oil which contains, probably, *a*-terpineol butyrate, as well as a phenol allied to callitrol, together with the usual terpenes. *C. calcarata*, "black," "red," or "mountain pine," leaves contained 0·168 per cent. of oil in which geranyl acetate and bornyl acetate were present. Geraniol

was also present in the oil from the fruits. *C. rhomboidea*, another "cypress" pine leaf, was dark coloured; it contains a considerable amount of geranyl acetate. *C. tasmanica*, "Oyster Bay pine," leaves, gave 0·14 per cent. of oil containing about 70 per cent. of free geraniol and geranyl acetate, and a small amount of a phenol. *C. drummondii* leaves gave 0·5 per cent. of oil containing more than 90 per cent. of dextro-*a*-pinene and only traces of esters. *C. muelleri*, "Illawarra pine" leaves, yielded 0·103 per cent. of oil consisting entirely of terpenes. *C. oblonga*, the native cypress of Tasmania, leaves contained 0·05 per cent., of oil, mainly terpenes. *C. macleyana*, "Stringy bark" or "Port Macquarie pine" gave 0·172 per cent. of oil from the leaves, containing dextro-*a*-pinene, dipentene and probably dextro-menthene and cadinene.

Dacrydium franklinii, the Tasmanian "Huon pine," leaves give 0·5 per cent., contains a new terpene, dacrydene, as its main constituent. This boils at 165–166°C.; sp. gr. 0·8524 at 22°C.; $\alpha_D + 12{\cdot}3°$; $\eta_{D22°}$ 1,4749. It has the generic formula $C_{10}H_{16}$; its nitroso chloride melts at 121°C. In addition to this the oil contains methyl-eugenol. *Pherosphæra fitzgeraldi* leaves gave 0·108 per cent. of bright lemon-yellow oil, which leaves a crystalline residue when evaporated; the main constituents are terpenes; there is a trace of an aldehyde present. *Phyllocladus rhomboidalis*, Tasmanian "celery-top pine," phylloclades yield 0·215 per cent. of essential oil; in addition to lævo-*a*-pinene the oil probably contains a sesquiterpene; the distillation residue yields a colourless crystalline body, m.p. 95°C.; $[\alpha]_D + 16{\cdot}6°$. It responded to the formula $C_{20}H_{32}$. The authors regard it as a diterpene composed of 2 mols. of pinene. It has been named phyllocladene. It is a saturated substance.

Prunus sphærocarpus, Essential Oil of. T. Peckolt. (*Berichte Pharm.*, 1910, **20**, 594; *Schimmels' Report*, April, 1911.) In the course of his investigation of Brazilian drugs the author reports on the essential oil of *Prunus sphærocarpus* obtained in minute quantity from the bark of the tree: it has the odour of bitter almonds; sp. gr. 1·0409. The flowers of the tree have a benzaldehyde odour. The seeds gave 0·91 per cent. of crystalline amygdalin. The distillate from the leaves contains HCN, varying in amount with the season of the year.

Rhodium, Essential Oil of. E. M. Holmes. (*Perfumery Record*, 1911, 2, 29.) An interesting historical record of this

oil, which is now admittedly factitious. It is an open question whether the genuine oil was distilled formerly from the wood of *Convolvulus scoparius* or of *Genista canariensis*, since both these, in old museum specimens and in literature, are referred to as true rhodium wood. It is suggested that lacking definite information as to the true botanical source, a definite formula for a factitious oil should be agreed upon.

Robinia pseudacacia, Essential Oil of. E. Elze. (*Chem. Zeit.*, 1910, **34**, 814.) The essential oil extracted from the flowers by volatile solvents, and freed from fats and resins by solution in alcohol, was dark coloured and when diluted with alcohol had the odour of the flowers; sp. gr. 1·05 at 15°C. It contained 9 per cent. of esters (calculated as methyl anthranilate), and a relatively large amount of indole. B.p., 60°–150°C., under 5 mm. Benzyl alcohol, *a*-terpineol, heliotropin, linalol, and ketonic or aldehydic bodies with a peach-like odour and bases of a pyridine nature were also isolated; nerol was also probably present among the alcohols.

Rosemary, Oil, Lævorotatory. (*Schimmels' Report*, Oct., **1910**, 112.) Spanish rosemary leaves, distilled in Leipzig, have yielded oil having the $\alpha_D - 2°50'$, thus proving conclusively that genuine Spanish and French oil of rosemary with lævorotation occur, and that such optical behaviour is not necessarily indicative of addition of turpentine oil. (See also *Y.B.*, **1905**, 150; **1906**, 68; **1908**, 171.)

Rose Oil, New Adulterant for. E. J. Parry. (*Chem. and Drugg.*, 1910, **77**, 65.) The adulterant generally used for otto of rose, geraniol, increases the sp. gr. and the η_D and lowers the so-called m.p. A 5 per cent. solution of nonyl or decylaldehyde in alcohol, containing suspended crystals of paraffin, is now being offered as an addition to correct the defects of the geraniol adulterant.

Rose, Oil, New Adulterant for. E. J. Parry. (*Chem. and Drugg.*, 1910, **77**, 261.) A new adulterant is being used, probably on a large scale, for otto of rose. It is significant that the plus ratio of exported product, to that of the genuine otto actually distilled, grows yearly greater. Six samples of rose oil of the highest quality of the new season's otto had the following char-

acters: Sp. gr. $\frac{30^\circ}{15^\circ}$ 0·8565 to 0·8582; α_D −4° to −5°; η_{D25}. 1,4630 to 1,4641; $\eta_{D2,^\circ}$ after washing, 1,4638 to 1,4651; m.p. 20·5° to 22°C. Total alcohols as geraniol, 73 to 75 per cent. Ten obviously adulterated samples had the sp. gr. $\frac{30^\circ}{15^\circ}$ 0·851 to 0·872; α_D −3°20′ to −9°; η_{D25}. 1,4572 to 1,4690; η_D after washing, 1,4642 to 1,4695; m.p. 17·5° to 21°; total alcohols as geraniol, 78 to 81 per cent. The new adulterant has not yet been isolated.

Sandalwood, East Indian, Constituents of the First Runnings of, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 117.) The presence of the following definite constituents was established in the first runnings of the oil. Isovaleric aldehyde, a ketone, $C_9H_{14}O$, santenone (π-norcamphor santenone alcohol) $C_9H_{16}O$, a hydrocarbon, $C_{11}H_{18}$; nor-tricyclo eksantalal $C_{11}H_{16}O$, and teresantalol. Mueller's santalone was also found, and there is present another ketone which may be isomeric with this.

Sandalwood, Essential Oil of. (*Evans' Analyt. Report*, **1910,** 65.) Samples distilled in Liverpool from East Indian wood during the year have given figures within the following limits: Sp. gr. 0·9743 to 0·9782; α_D −16°42′ to −20°0′; total santalol, 91·8 to 98·8 per cent.; santalyl acetate, 3·3 to 5·8 per cent. The oils were soluble in 3½ to 8 volumes of 70 per cent. alcohol at 20°C. (See also *Y.B.*, **1904,** 161; **1906,** 71; **1907,** 66, 143; **1908,** 175 to 180; **1909,** 79, 80; **1910,** 74, 92.)

"Sandalwood" Oil from French Guiana. P. Jeancard and C. Satie. (*Perfumery Record*, 1911, **2,** 79.) Although the authors deprecate the loose application of the name "sandalwood" to various kinds of aromatic woods which have nothing in common with the true East Indian *Santalum album*, they have provisionally given this name to the oil of a botanically undetermined wood, the tree producing which grows plentifully in French Guiana, in proximity to that producing "Bois de Rose." This so-called Guiana sandalwood oil, as distilled in Grasse from imported wood, shows a very wide range of characters in different batches. Sp. gr. from 0·963 to 1·0122; α_D from +0°30′ to −6°; solubility in alcohol 75 per cent., 1 : 1·5 to 1 : 12; saponification value, 13 to 65 acetyl value, 65 to 117. These

divergencies are caused by the presence in greatly differing quantities of a new tertiary alcohol, maroniol; b.p. 158–159°C. under 20 mm.; a_D −6°; sp. gr. 1·0378; solubility, 1 : 1·6 of alcohol 70 per cent.; 1 : 6·5 in alcohol 60 per cent.; acetyl value after acetylizing for 5 hours in xylene solution (*Y.B.*, **1910,** 85.) Maroniol is a fragrant viscous colourless liquid. In solution in petroleum ether it is attacked by Na, with liberation of H.

Savin, Constituents of Essential Oil of. F. Elze. (*Chem. Zeit.*, 1910, **34,** 767.) The main constituent of savin oil is not sabinol but its acetic ester, sp. gr. 0·972 at 15°C.; a_D + 79°; b.p. 81–82° under 3 mm. The lower boiling fractions contain normal decydic aldehyde, and the higher boiling fractions give geraniol.

Schinus molle, Essential Oil of. G. Laloue. (*Bull. Soc. Chim.*, 1910, **7,** 1107.) The oils distilled from the branches of the plant grown in Algeria and at Grasse have been compared. From *Algerian plants:* sp. gr. 0·8634 at 15°C.; a_D + 50°54′; solubility in alcohol 90 per cent., 1 : 5; acid value, 0; ester value, 5·5; acetyl value, 29·4. From *Grasse plants:* sp. gr. 0·8696; a_D + 46°13′; solubility in alcohol 90 per cent. 1 : 10 then turbid; acid value, 2·1; ester value, 8·2; acetyl value, 43·4. The leaves of the Algerian plant were also distilled separately, giving an oil differing slightly from that of the branches, having an acetyl value of 40·4. Pinene, phellandrene and a sesquiterpene were isolated.

Spearmint, Essential Oil of, Dihydrocuminyl Acetate in. F. Elze. (*Chem. Zeit.*, 1910, **34,** 1175.) Dihydrocuminyl acetate is a constituent of the oil of *Mentha viridis* and is an important factor of the characteristic odour. The odour disappears when spearmint oil is saponified, due to the decomposition of this ester. Phellandrene is also present in the oil.

Star-Anise, Essential Oil of. (*Evans' Analyt. Notes*, **1910,** 9.) Some anise oils have been met with which have evidently been partially deprived of anethol. In these the portion distilling between 225–235° amounted only to 55–65 per cent.; compared with 80–90 per cent. with oils of good quality. The characters of certain of these low grade oils practically answer the requirements of the B.P. 1898. (See also *Y.B.*, **1910,** 70.)

Star-Anise, Essential Oil of, Old. A. W. Knapp. (*Pharm.*

J., 1911 [4], **31,** 795.) The characters of a museum sample of anise oil at least 40 years old, are discussed at length. These were sp. gr. 0·988 ; a_D −0·1 ; m.p. 10°C. ; solubility in alcohol, 90 per cent., turbid 1 : 10 ; residue at 100°, 11 per cent. ; Wijs value, 155 ; $\eta_{D16°}$ 1·5505 ; Koettstorfer value, 6·3. On fractional distillation 45 per cent. distilled below 225°C. (See also *Y.B.*, **1910,** 371.)

Star-Aniseed, Oil of, Abnormal. T. H. Durrans. (*Perfum. Record*, 1911, **2,** 60.) A parcel of a well-known brand of star-anise oil was found to have the abnormal $\eta_{D2°}$ 1.5524 and when fractionated, the congealing and melting points of the higher boiling fractions were very markedly lower than the corresponding fractions of genuine normal oil. The oil does not appear to be adulterated with ordinary fennel oil nor with Japanese fennel oil. It is possibly an "abnormal" distillate, possibly partially de-anetholized ; or an old oil.

Incidentally, the Japanese fennel oil originally reported on by J. C. Umney (*Y.B.*, **1896,** 282) was examined and found to have undergone marked change in the course of the 15 years which have lapsed. This now has the following characters : Sp. gr. 1·002 at 15°C. ; congealing point +0° (approximately) ; m.p. 4°C. ; a_D + 11°30′ ; η_D 1,5368.

Star-Anise, Oil of, Adulterated. E. J. Parry. (*Chem. and Drugg.*, 1910, **77,** 687.) A series of samples of adulterated anise oil showing a low sp. gr., η_D and m.p. have been met with, as shown by the following characters : Sp. gr. at 20°, 0·9575 to 0·9740 ; η_D at 20°, 1,5460 to 1,5475 ; m.p. 12° to 15° ; congealing point, 10·5° to 12° ; a_D −0°15′ to +0°35′.

A large sample from one shipment was examined more fully, and finally a bulked sample made from a number of the above described samples, and fractionally distilled side by side with a pure anise oil. The results of this distillation are embodied in the following table :

	Adulterated oil.	Pure oil.
Specific gravity at 20°	0·9720	0·982
Optical rotation	0°	−1°10′
Refractive index at 20°	1,5469	1·547
Melting-point	13°	18°
Congealing-point	11°	15°
Ref. index of first 10%	1,5160	1,5346
Melting-point of first 10%	−3° (partial solidification)	8°
Refractive index of second 10%	1,5308	1,5496
Refractive index of last 20%	1,5403	1,5560

All the intermediate fractions had lower refractive indices and lower melting-points than the corresponding fractions of the pure oil, and the amount distilling between 225° and 235° was only 69 per cent., against 87 per cent. for the pure oil. The residue of 20 per cent. was less soluble in alcohol than the corresponding fraction of pure aniseed oil. The odour of the adulterated oils was characteristic, and quite different from that of pure oil. These figures prove conclusively that these samples were not genuine anise oil, and taken in conjunction with the peculiar odour and taste, indicate strongly that the adulteration took the form of the addition of some foreign oil. The most probable adulterant is some fraction of camphor oil.

Star-Anise Oil, Adulterated or Deficient in Anethol. (*Schimmels' Report*, April, 1911, 107.) The anise oil with abnormal characters which has attracted considerable attention in England is not considered to be adulterated, but to be of low anethol content. Genuine anise oil from which a portion of the anethol was removed was found to give fractionation results very similar to those obtained by the English chemists.

Star-Anise Oil, Modified Refractive Index for. H. R. Jensen. (*Pharm. J.*, 1910 [4], **31**.) The lower limit for the η_D of aniseed oil proposed by Hill and Umney (*Y.B.*, **1910,** 71) would seem to stand in need of slight revision if seasonal variation is to be fully allowed for. A sample of pure star aniseed oil was recently examined; having the $\eta_{D25°}$ 1,5505. Pure oils with a similarly low refractive index have recently been quoted by Parry this season. Harvey and Wilkie have also published values indicating that the lower limit ought to be extended to 1·550 at 25°.

The oil under notice gave the following figures: Sp. gr. 0·9814 at 20°C.; α_D −0°6′; $\eta_{D25°}$ 1,5505; solidifying point, 16°C.; m.p. 17·5°C.; soluble 1 : 1·75 in alcohol 90 per cent.

Distillation Temperature.	No. of Fraction.	Size Fraction.	$\eta_{21°}$.	Sp. gr. 17°.	α_D.	M. Pt.
225·5°–229° .	1	10%	1,5373	0·957	−0° 45′	12°
229°–230° . .	2	15%	1,5459	0·971	−0° 38′	15°
230°–231·5° .	3	20%	1,5536	0·983	−0° 5′	19·3°
231·5°–232·7° .	4	20%	1,5565	0·985	0°	19·5°
232·7°–235° .	5	20%	1,5574	0·989	+0°8′	20·5°
235°(–250°) .	Residue	15%	1,5565	0·9885	—	18·5°

85 per cent. of this oil distilled between 225·5–235°.

An adulterated oil (with possibly a camphor oil terpene and sesqu terpene) gave the following results : Sp. gr. 0·9755 at 20°C. ; a_D + 0°10′ ; ($\eta_{D25°}$) 1,5465 ; solidifying point, 13·5° ; m.p. 15° ; soluble 1 : 2·25 in alcohol 90 per cent.

Distillation Temperature.	No. of Fraction.	Size Fraction.	Ref. Index 21°.	Sp. gr. 17°.	Opt. Rot.	M. Pt.
226°–229° .	1	10%	1,5283	0·946	0°	Does not freeze at —5°
229°–231° .	2	15%	1,5434	0·9685	—0°10′	Does not freeze at —2°
231°–233° .	3	20%	1,5500	0·978	+0°6′	16°
233°–235° .	4	20%	1,5534	0·983	+0°4′	17·5°
235°–243° .	5	20%	1,5545	0·9847	+0°8′	18°
Above 243° .	Residue	15%	1,5522	0·982	—	—

Only 65 per cent. of this oil distilled between 226°–235°C., and from the fact that pure anethol has a sp. gr. 0·986 (25°), $\eta_{D25°}$ 1,5585, this constituent is evidently not present in its correct proportion. The first fractions had a disagreeable odour. The adulterant is apparently dextro-rotatory.

Tarragon Oil. (*Roure-Bertrand's Report*, Oct., **1910,** 43.) A batch of authentic oil distilled at Grasse had the sp. gr. 0·9814 ; a_D + 2°56′ ; saponification value, 29·8 ; soluble 1 : 4 of alcohol 80 per cent. This oil has a higher sp. gr. and is more soluble than the ordinary commercail oil.

Terpin, Volatility of, at 100°. — Leulier. (*J. Pharm. Chim.*, 1911, **3,** 440.) Terpin is volatile at 100°C. Therefore the statement in the French Codex, **1908,** that when exposed to that temperature it loses 1 mol. H_2O, or one-tenth of its weight, is incorrect. It loses 9 per cent. in 30 minutes ; 35 per cent. in 7 hours ; in 24 hours it completely volatilizes, leaving no residue. The alternative method of the official text, exposure *in vacuo* over H_2SO_4 at normal temperatures, is the only one available for determining the degree of hydration of terpin.

Thea sasquana, Essential Oil of. K. Kimura. (*Berichte Pharm.*, 1911, **21,** 209.) The leaves yield to steam distillation from 0·4 to 1 per cent. of aromatic essential oil ; the colour of which is dark brown becoming violet on oxidation, sp. gr. 1·061 at 21°C. ; optically inactive. It consists of 97 per cent. of eugenol ; small quantities of a ketone or an aldehyde ; and a

fragrant ester, which is split up by saponification into an unpleasant smelling acid, and an alcohol with a rose-like odour, b.p. 230°.

Thymbra spicata, Essential Oil of. (*Schimmels' Report*, **1910**, 147.) This labiate, a native of Greece and Asia Minor, has yielded 1·5 per cent. of oil, with a thyme-like odour, and containing about 66 per cent. of carvacrol. It had the sp. gr. 0·9460 ; a_D 0 ; $\eta_{D20°}$ 1,50675 ; soluble 1 : 35 of alcohol 70 per cent.

Thymol, Two New Isomers of. C. Guillaumin. (*Bull. Sci. pharm.*, 1910, **17**, 373.) By treating the two cresotinic acids derived from ortho- and para-cresol by the method of Béhal and Tiffeneau the author has succeeded in preparing ortho- and para-thymol, natural thymol being meta-thymol. Orthothymol was obtained thus. Ortho-cresotinic acid was first esterified with MeOH; methyl orthocresotinate was thus obtained. By treating the potassium derivative of this with methyl iodide, methyl-methylorthocresotinate was obtained. This ester salt was treated with methyl-magnesium iodide. The tertiary alcohol thus obtained was dehydrated by heating with acetic anhydride, when the product was $(CH_3)_3(CH_3O)_2C_6H_3 -C(CH_3) = CH_2$. When this was treated with Na and EtOH, the methyl ester of orthothymol $(CH_3)_3(CH_2O)_2C_6H_3 - C_3H_7$ was formed. When this was demethylated orthothymol was obtained. This is a colourless liquid, b.p. 225–226°C., with a cresol odour ; soluble 0·8 : 1000 in water ; therefore less soluble than natural thymol. Parathymol is prepared in an analogous manner, starting with paracresotinic acid. It crystallizes from acetic acid in long needles, m.p. 35°C. ; b.p. 228–229°. Solubility in water 1·66 : 1000 at 17°C. Natural thymol dissolves 1·1 : 1000. If a particle of parathymol be dissolved in 2 c.c. of acetic acid and warmed with 2 c.c. of H_2SO_4 and 1 c.c. of water, a yellow colour is produced. Orthothymol and natural thymol give an intense cherry red colour. Natural thymol is slightly more toxic than the other two forms. Parathymol and natural thymol are equal in bactericidal action on Eberth's bacillus ; orthothymol only half as active. As a vermicide, natural thymol acts more rapidly than parathymol, and orthothymol is the least active of the three. Natural thymol is therefore superior to its two isomers for therapeutic use.

Thymus mastichina, Essential Oil of. B. Dorronsoro. (*Schimmels' Report*, April, **1911,** 111.) Although a considerable amount of oil is distilled from this plant, and is a commercial article, it has only recently been examined. Sp. gr. 0·907—0·945 $\frac{20°}{15°}$C. α_D — 0°50′ to + 4°40–; $\eta_{D23°}$ 1,4630 to 1,4654; saponification value, 12·7 to 18·5; acetyl value, 29·2 to 49·3. The oil contains the following percentages of the constituents named: Dextro-*a*-pinene; 7 to 8; cineol, 64 to 72; phenols, traces; ketones, doubtful traces; esters as linalyl acetate, 4·44 to 6·47; free alcohol, 8·2 to 14·1.

Turpentine, Essential Oil of, Tests for. F. H. Alcock. (*Pharm. J.*, 1910 [4], **31,** 275.) An adulterant is at present being used for oil of turpentine, which does not affect the sp. gr. nor the b.p. It gives, however, a fluorescent solution with glacial acetic acid. Oil of turpentine thus adulterated is not soluble 1 : 3 in alcohol 94·9 per cent., as required by the official test of the U.S.P.

Turpentine, Production of Formic Acid by the Atmospheric Oxidation of. C. T. Kingzett and R. C. Woodcock. (*J.S.C.I.*, 1910, **29,** 791.) The crystalline formation found to occur in galvanized iron tanks in which air-oxidized Russian turpentine had been stored is found to consist of zinc formate. The authors definitely confirm, by analytical data, the previously noted formation of formic acid in this manner. It is regarded as a cleavage product of some change slowly occurring in the air-oxidized oil. When Russian or American turpentines are oxidized in presence of water, acetic and formic acids are formed. Dry Russian or American turpentine vapour has no action on zinc foil; but in presence of aqueous vapour a deposit of zinc formate is formed on the foil.

Vervain Oil, True. W. A. Wrenn. (*Perfumery Record*, 1910, **1,** 283.) The essential oil of the leaves of *Verbena triphylla L.* (*Lippia citriodora*), though very fragrant, and specially suited for perfumery, has hitherto possessed only a limited commercial interest, owing to its similarity to ordinary lemongrass oil. The oils offered as "Huile de Verveine" have, in many cases been fictitious oils, much on the lines of the so-called rhodium oil.

An oil distilled from *Lippia citriodora* has been reported on

by J. C. Umney; this was produced at the Government flower farm, at Dunolly, Victoria, Australia (*Y.B.*, **1897,** 186).

A sample from Grasse has lately been found to have the following characters: Sp. gr. at 15°C., 0·912; α_D −15°; citral by absorption, 37·5 per cent.; insoluble in 70 per cent. or 80 per cent. alcohol.

Two samples examined in previous years had the following characters :—

	No. 1.	No. 2.
Specific gravity at 15°C.	0·905	0·918
Optical rotation	−12°	−16°
Citral by absorption	26%	21%

Violet Oil, Artificial. (*Perfumery Record*, 1910, **1,** 161.) Commercial violet oils may be divided into two types: the *α*-ionone type, sp. gr. 0·934 to 0·940; η_D 1,4988 to 1,5018; b.p. 123 to 124°C. under 11 mm.: the *β*-ionones, sp. gr. 0·946 to 0·952; η_D 1,5093 to 1,5190; b.p. 134 to 135°C. under 15 mm. After correction for pressure these boiling points show a difference of 8° to 10°C. *β*-ionones are not so pure as the *α*-ionones, since the better qualities of the latter are obtained from a crystalline compound. The *α*-ionones are sweeter (more floral) and are useful as adjuncts to the natural flower extracts. *β*-ionones have a heavier odour, with a suggestion of coumarin, and are more suitable for soap perfumery. Many commercial samples are mixed with benzy benzoate. Others are blends with natural products such as orris extract and cassie extract.

Warburgia stuhlmanni, Essential Oil of. W. Lenz. (*Ber. pharm.*, 1910, **20,** 351.) The wood of this Canellaceous tree is found in commerce at Zanzibar along with so-called "sandalwood." On distillation with steam the bark yields 0·6 per cent. of a viscous, reddish-yellow oil, which has an odour like that of sandalwood oil; sp. gr. 0·9864 at 20°C., $[\alpha]_{D20°}$ −41·77°; $\eta_{D20°}$ 1,51269; saponification value, 11·2; acetyl value, 100·3. The oil contains aldehydic and alcoholic constituents, in addition to esters and traces of acid; soluble 1 : 1 in alcohol 90 per cent.; almost insoluble in alcohol of 70 per cent. The oil shows great resemblance to that of *Osyris tenuifolia*, the so-called African "sandalwood oil." The residual bark, after steam distillation, yielded 1·4 per cent. of mannitol.

Xanthoxylum alatum, Essential Oil of. (*Schimmels' Report*, Oct., **1910,** 147.) The fruits were received from London under

the name of "Chinese wild pepper." The shrub yielding them belongs to the N.O. *Rutaceæ*. The fruits gave 3·7 per cent. of oil, and on further distillation 0·9 per cent. of a crystalline substance which was not soluble in the oil. The oil was lemon yellow, and had a peculiar odour resembling that of water fennel; sp. gr. 0·8653 at 15°C.; α_D −23°35′; $\eta_{D20°}$ 1,48131; acid value, 9·9; ester value, 10·3; acetyl value, 33·6; soluble 1 : 2·6 of alcohol 90 per cent. The oil appears to consist mainly of terpenes, probably phellandrene. The solid substance forms optically inactive needles or leaflets, m.p. 83°C. It appears to be a phenol or lactone.

Zedoary Root, Essential Oil of. R. F. Bacon. (*Philippine J. Sci.*, 1910, **5**, 257; *Schimmels' Report*, April, **1911**, 122.) The characteristic aroma of zedoary root is due to a sesquiterpene alcohol, b.p. 140–166 under 7 mm. It is readily crystallized, forming crystals several inches long, m.p. about 67°C.; it sublimes partially before it boils; sp. gr. 1·01 at $\frac{30°}{30°}$C.; α_D + 0.

FATS, FIXED OILS AND WAXES

Anthemis nobilis, Further Note on Anthesterin of. T. Klobb. (*Comptes rend.*, 1911, **152**, 327.) Pure anthesterin has the formula, $C_{31}H_{52}O + 3H_2O$. It furnishes three isomeric acetates with acetic anhydride; two of which form monobromo substitution products, and the third, a dibromo-product. In the petroleum ether extract of *Anthemis* flowers, anthesterin is accompanied by a hydrocarbon, $C_{30}H_{62}$. Anhydrous anthesterin melts at 195°C.; α_D + 79°4′ in $CHCl_3$. By saponifying the fractionated crystalline acetates, *α*-anthesterin is obtained from the first; *β*-anthesterin from the second, and needles from the third showing a double melting point, 158–160°C. and 185–190°C. (See also *Y.B.*, **1903**, 34.)

Arganum sideroxylon Nuts, Oil of, Substituted for Olive Oil. E. A. Sasserath. (*Zeits. Untersuch. Nahr. Genusmitt.*, 1910, **20**, 749.) The kernels of this tree, which is common in the Atlas district, yield 50 per cent. of fixed oil. This has been put on the market as "Moroccan olive oil." It is a golden yellow oil, with an odour resembling that of arachis oil; sp. gr. 0·9188 at 15°C.; acid value, 0·18; saponification value, 192·12; iodine value, 95·94; Reichert-Meissl value, 1·8; Hehner value,

95·6. The high iodine value has been explained by the influence of soil and climate on the "olive" oil. The author has examined over 500 samples of genuine Moroccan olive oil and does not find the iodine value to approach the above figure. The oil of argan has no marked reaction with Baudouin's test or with Halphen's reagent, but when shaken with HNO_3, sp. gr. 1·4, it gives a bright persistent carmine red colour. This reaction and the high iodine value serve to distinguish argan oil from genuine olive oil.

Bassia Oils, Indian, Characters of. A. Kesava Menon. (*J.S.C.I.*, 1910, **29**, 1429.) *Bassia butyracea* fat, known as "Phulvara," "Churi," "yel," has a pleasant odour and taste. The yield from the kernels to petroleum ether is 64·8 per cent. of oil; sp. gr. 0·8924 100°/100°C.; m.p. in capillary tube, 46·7°C.; acid value, 66·8; saponification value, 194·65; Reichert Meissl value, 1·28; iodine value, 41·22. *Bassia latifolia* fat, known as "Illupi" and "Mowrah," is yielded to the extent of 45·7 by petroleum ether extraction. It is solid yellowish white fat. The oil is used as an adulterant of ghee; and the press cake as a fish poison. The smoke from it is said to kill insects and rats. The oil has the m.p. 47·8C. in capillary tube; acid value, 153; saponification value, 187·6 to 190; Reichert Meissl value, 1·6; iodine value, 50·4. *Bassia longifolia* seeds, also known as Illupi, yield 53 per cent. of white fat softer than that of the above mentioned species. The oil cake, under the name of "illipi poonac," is rubbed on the body for cleansing purposes. The fat melts at 30·2°C. in capillary tube; acid value, 26 to 29; saponification value, 185·6; Reichert Meissl value, 1·75; iodine value, 58·2.

Beeswax Yellow, Some Varieties of. (*Evans' Analyt. Notes*, 13.) The following exceptional samples of beeswax have been examined:

Source.	Acid Value.	Ester Value.	Sap. Value.	Sp. gr.	M. Pt.	Wijs Value.
Australia . .	18	76·5	94·5	0·967	63·5°	—
China . . .	7	86	93	0·967	65°	13·8
Jamaica . .	17·5	70	87·5	0·966 pale 0·980 dark	64°	—
Peru . . .	18	73	91	0·966	64°	—
Mozambique .	20·3	77	97·3	0·969	63°	—

(See also *Y.B.*, **1904**, 193; **1905**, 45; **1909**, 15.)

Candelilla Wax. R. F. Hare and A. P. Bjerregard. (*J. Ind. Eng. Chem.*, 1910, **2**, 203.) The wax coating the whole plant of *Euphorbia antisyphilitica* was removed by boiling the material in water, separating the cake of wax formed on cooling; dissolving it in hot $CHCl_3$ and filtering. After removing the $CHCl_3$ the residue was redissolved in a mixture of three of Et_2O and two of C_6H_6, again filtered, and the solvent evaporated off. The residual wax was then melted and dried. It had the following characters: Sp. gr. 15°/15°C., 0·9825; m.p. 67–68°C.; solidifying point, 64·5°; acid value, 12·4; saponification value, 64·9; iodine value, Hanûs; unsaponifiable matter, 91·2 per cent.; fatty acids, 0·57 per cent.; $\eta_{D\ 71·5°}$ 1,4555. The wax was harder than beeswax, but softer than carnauba wax. (See also *Y.B.*, **1910,** 96.)

Cardamom, Fixed Oil of. A. Luhn. (*Seifen. Zeit.*, **37,** 1460; *Chem. Zentralh.*, 1911, **1,** 504.) Besides essential oil, the seeds of *Cardamomum minus* contain about 10 per cent. of yellowish green, butter-like oil, resembling palm oil in consistence; sp. gr. 0·903, 100°/15°C.; saponification value, 206; Reichert Meissl value, 3·6; Hehner value, 95·0; iodine value, 92; congealing point, 17·8°; m.p. 24·5; free fatty acids as oleic acid, 4·5 per cent.; unsaponifiable constituents, 0·35 per cent. (See subsequent abstract).

Cardamom Oil, so-called, Harmful Properties of. A. Reinsch. (*Chem. Zeit.*, 1911, **35,** 77.) Numerous cases of poisoning have been reported to follow the use of certain brands of German margarine; the cause has been traced to the employment of so-called "cardamom oil" in the manufacture. From its characters, this appears to be chaulmoogra oil, or an allied fat. It has also been put on the market under the name of "Maratto fat" and "Marotty oil." The characters of crude and purified "cardamom oil," and of chaulmoogra oil, are given below.

	Butyro-Refractometer Reading at 40°C.	Acid Value.	Saponification Value.	Reichert Meissl Value.	Iodine Value.	Optical Rotation.
Crude "Cardamon Oil"	70·4–71·3	18·8–28·7	203·1–205·3	0·85–1·33	93·0–94·7	+58·8–64·5·
Purified "Cardamon Oil"	69·7–71·1	0·8–7·9	203·5–208·1	0·62–1·14	88·5–94·0	+54·0–58·0
Chaulmoogra Oil	71·1	44·8	200·3	0·29	97·8	+56·0

Carnauba Wax. (*Evans' Analyt. Report,* **1910,** 20.) A sample of genuine wax had the characters : Sp. gr. 1·001 at 15°C. ; m.p. 84°C. ; acid value, 5 ; ester value, 81. Two samples were met with adulterated with hard paraffin. (See also *Y.B.*, **1906,** 19 ; **1907,** 32 ; **1908,** 229 ; **1910,** 96.)

Castor Oil. (*Evans' Analyt. Report,* **1910,** 20.) All the medicinal castor oils examined have fallen well within the proposed B.P. limits. An acid value exceeding the equivalent of 0·75 per cent. is quite exceptional with oil cold-pressed from fresh seeds.

Coconut Oil, Determination of, in Butter Fat. N. C. Cassal and B. H. Gerrans. (*Chem. News,* 1910, **102,** 190.) Three Gm. of the filtered fat is saponified with 2 c.c. of NaOH solution, 1 : 2, and 10 c.c. of absolute EtOH ; the EtOH is driven off, and the soap dissolved in 50 c.c. of boiling water. The solution is treated with 10 c.c. of strong HCl and 50 Gm. of anhydrous granulated $CaCl_2$, and the flask is connected by means of a bent tube with a condenser and by means of a second tube passing nearly to the bottom of the flask with a steam generator. The flask is immersed to the level of its contents in a $CaCl_2$ bath which is maintained at 141° to 146°C., and steam is passed through it until 500 c.c. of distillate have passed over. As the distillate leaves the condenser it falls through a filter into the receiver. When the above volume of distillate has been collected, the distillation is stopped and the aqueous filtrate is rejected. The inner tube of the condenser is washed with cold water on to the filter, and then washed out with hot methylated spirit. The insoluble fatty acids upon the filter are also washed with cold water, and then dissolved in hot methylated spirit, the solution added to the alcoholic washings from the condenser, and the bulked alcoholic solution is titrated with $N/10Ba(OH_2)$. The mean value thus obtained for pure butter fat is 14·67 c.c., whilst that of coconut oil is 66 c.c. Since certain butters give results somewhat above 15, the value 16 is chosen as the "titration standard" for genuine butter. In the case of mixtures the percentage of coconut oil in the fat taken is calculated from the formula $(A-16) \times 2 = x$, where A represents the titration figure obtained. (See also *Y.B.*, **1904,** 65 ; **1907,** 44, 45, 47.)

Cod-Liver Oil. (*Evans' Analyt. Notes,* **1910,** 25.) Twenty

samples of genuine Norwegian and Newfoundland oils varied within very narrow limits, viz.: Sp. gr. 0·9255 to 0·9270; refraction figure, 41 to 43°; $\eta_{D15°}$ 1,4805 to 1,4810; saponification value, 183·4 to 195; Wijs value, 160 to 173. One sample, probably adulterated with seal oil, had a sp. gr. 0·9256; refraction figure + 32·5°. Two samples of genuine, congealing Norwegian oil had the values: Sp. gr. 0·928; saponification value, 182; refraction figure, + 47·5°; $\eta_{D15°}$ 1,4821; Wijs value, 156·8. An authentic sample of Japanese cod-liver oil possessed a colour and odour indicating less perfect preparation than Norwegian; it had: Sp. gr. 0·9252; refraction figure, +41·5°; saponification value, 182; Wijs value, 164·6, and withstood freezing. The refractive index falls within narrower limits than those proposed as the official standard: 1,4803 to 1,4820, including all genuine oils examined. (See also *Y.B.*, **1904,** 200; **1905,** 62, 64, 65; **1906,** 26; **1908,** 54; **1910,** 97.)

Cod-Liver Oil, Characters of. (*Southall's Report*, **19,** 8.) The following figures represent results obtained with authentic oil of high quality: Sp. gr., 0·9270; saponification value, 188·6; iodine absorbed, 164·8 per cent.; unsaponifiable matter, 0·93 per cent.; refractive index, 1.4806; free fatty acid as oleic acid, 0·17 per cent.; colour reactions, normal. The figures suggested by Bird and Lucas are considered to be satisfactory.

Cod-Liver Oil, Detection of Menhaden Oil in. A. W. Hoppenstedt. (*J. Amer. Leather Chem. Assoc.*, 1910, **12,** 553; *J.S.C.I.*, 1911, **30,** 36.) When menhaden oil is shaken with HCl it acquires a greenish colour, which is not given by any other oil. The test is carried out as follows:—5 c.c. of the oil is dissolved in 5 c.c. of acetone in a test-tube of about $\frac{5}{8}$ in. diameter, 1 c.c. of strong HCl is added, and the whole shaken vigorously. 5 c.c. of petroleum ether is next added, and after mixing and allowing to separate, the colour of the acid layer is observed. With pure menhaden oil an intense bluish green is produced; with pure cod-liver oil the layer assumes a yellow or brown colour, with no trace of green or blue. With a mixture of equal parts of menhaden oil and cod-liver oil the green colour is apparent, but is partially masked by the brown colour. The green colour can be observed when the quantity of menhaden oil is not less than 20 per cent., but below that point it is almost completely masked by the brown of the cod oil.

Fatty Acids, Separation of Liquid and Solid, as Ammonium Salts. David. (*Annales Chim. Analyt.*, 1911, **16,** 8.) The ammonium soaps of the known solid fatty acids are quite insoluble in a large excess of strong solution of AmOH, whereas those of the liquid fatty acids are perfectly soluble. This difference of solubility enables them to be separated quantitatively. Two Gm. of the fat is dissolved in 5 c.c. of EtOH (95 per cent.) at a gentle heat. Fifty c.c. of AmOH solution, sp. gr. 0·925, is then added, and heating continued until bubbles of gaseous NH_3 appear. The clear liquid is set aside for several hours, preferably over night, at a temperature of 14°C. The insoluble ammonium palmitate, or stearate, is then filtered out, and washed on the filter with solution of AmOH of the same strength until a drop of the filtrate gives no precipitate with $Ba(OH)_2$ solution. The soaps on the filter are then treated with HCl, sp. gr. 1·160, diluted with an equal volume of water. This liberates the fatty acids, and the AmCl is washed out, at first with acid water, as long as any AmCl is present, and then with water. The fatty acids are then easily detached from the filter, transferred to a capsule, melted, dried at 100°C., and weighed. The liquid fatty acids may be determined by difference, or, if desired, by direct weighing. They are liberated from the ammoniacal filtrate by the addition of HCl, collected in the usual manner and dried at 120°C. before weighing.

Fats and Waxes, Propyl Alcohol as Solvent in Saponification Test. L. W. Winkler. (*Apoth. Zeit.*, 1911, **26,** 301.) The author recommends propyl alcohol as a substitute for ordinary alcohol as the solvent for the standard alcoholic KOH solution, and also for the fats or waxes to be saponified ; the higher b.p. of propyl alcohol renders saponification more quickly complete. With the majority of fats boiling for 10 to 20 minutes is sufficient. Substances difficult to saponify require heating for 30 minutes.

Ghee, Characters of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1428.) Samples of pure authentic cow and buffalo ghee had the following characters :—

	Cow Ghee.	Buffalo Ghee.
Fat—		
Specific gravity, d 100°/100°	0·8961	0·8965
,, ,, d 100°/15°	0·8616	0·8619
Acid value	1·49	2·00
Saponification value	218·25	206·8
Reichert Meissl value	25·70	18·24
Titration No. of insoluble volatile acids, 1 10 KOH	2·07	0·74
Unsaponifiable matter per cent.	0·59	0·73
Butyro refractometer at 25°C. "degrees"	49	—
,, ,, 40°C. ,,	40·6	44·5
,, ,, 45°C. ,,	—	42·0
Fatty Acids (total insoluble)—		
Per cent.	88·05	90·65
Titer test	39·75	45·30
Neutralization value	210·4	204·9
Mean molecular weight	266·6	273·8
Iodine value	32·8	30·7

Ghee is adulterated on an enormous scale in India; practically all common oils, even including castor oil, are used for the purpose.

Ghee, Analytical Characters of. E. R. Bolton and C. Revis. (*Analyst*, 1910, **35**, 344.) A table, giving analytical data obtained with nine samples of pure and adulterated commercial ghee, and also, for comparison, those of the fat of *Bassia butyracea*, is given. This will be useful for reference for Indian pharmacists and analysts.

Japan Wax. E. Tassily. (*Bull. Sci. Pharm.*, 1911, **18**, 329.) Japan wax is produced from various species of *Rhus*, natives of Japan and China, chiefly from *R. succedanea*, *R. acuminata*, *R. vernicifera*, *R. sylvestris* and other species. The seeds are bruised and hot pressed in wooden presses. In many instances the crushed seeds are treated with *Perilla* oil before pressing, which increases the iodine value of the wax. The crude wax is greenish. It is bleached by exposure to the sun. It is chiefly exported from Kobé. The specimen examined by the author had the m.p. 52–53°C.; congealing point, 42°C.; acid value, 19; saponification value, 226; iodine value, 12. It is composed chiefly of palmitin and free palmitic acid. It contains, besides, japanic acid, $C_{19}H_{38}(COOH)_2$, as well as its two lower homologues, and traces of soluble acids, probably including

iso-butyric acid; traces of pelargonic acid, an acid with the formula $C_{15}H_{30}O_2$, and traces of stearic and oleic acid, but no arachidic acid. The wax examined contained 0·54 per cent. of unsaponifiable matter.

Jatropha glandulifera Oil. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29**, 1431.) Vernacular names: Addalai, Uddalai (Tamil); Nikumba (Sanskrit). The seeds yielded to Et_2O 21·3 per cent. of a light straw-coloured oil which was turbid at a temperature of 55°F. This oil is prepared in India by collecting the capsules when they just begin to split open and change their colour from green to brown. The fruits are then exposed for a few hours' bright sunshine, when the seeds readily separate from the shell. The oil is then obtained by expression. It is chiefly used by the natives as an embrocation against rheumatism and paralysis. Like other oils of the *Curcas* family, it is employed as a purgative, and is considered to be a good remedy in cases of ulcers and ringworm. Acid value, 15·79; saponification value, 194·5; Reichert Meissl value, 4·00; melting point of fatty acids, 35°C.; iodine value of fatty acids, 119·6.

Lanoline, Valuation of. (*Evans' Analyt. Notes*, **1910**, 40.) The saponification and iodine values are of considerable use in determining the quality of lanoline; these tests should be made official. The ordinary reflux saponification is not satisfactory, but maximum values are readily obtained by distilling off to dryness three times, the mixture of N/2 alcoholic potash and lanoline, the increasing concentration of the alkali ensuring complete saponification. This is a general method for saponifying refractory substances. The Hubl method for determination of the iodine value is not satisfactory with lanoline. Perfectly comparable iodine values may be obtained with either Wij's or Hanus's solution, using 0·2 grams of fat, 20 c.c. of reagent, and giving 4 hours' contact at 15° to 20°C.

Lard, Tests for in the Ph.G. V. A. Schneider. (*Pharm. Zentralh.*, 1911, **52**, 306.) The official regulation tests quoted in the text of the Ph.G. V. as being applicable to lard have been slightly altered as follows: *Detection of boric acid and its salts.*—Fifty Gm. of the lard is melted on the water-bath, shaken in a flask with 30 c.c. of water at about 50°C. and 0·2 c.c. of HCl, sp. gr. 1·124, for 30 seconds. The mixture is warmed until the

aqueous liquid has separated. This is freed from fat by filtration. Twenty-five c.c. of the filtrate is taken and curcumin paper (white filter paper moistened with a 1 : 1000 solution of curcumin in alcohol 90 per cent. and dried) moistened therewith and dried. If no marked alteration of the yellow colour be evident the lard is free from boric acid. If it shows a reddish or orange red tint, this portion of the test paper is moistened with a 2 per cent. solution of anhydrous Na_2CO_3. If the colour produced does not differ from that given with a blank experiment with the paper and Na_2CO_3 solution only, no boric acid is present, which would produce a bluish shade. The flame test for boric acid is thus applied. Five c.c. of the above alkaline liquid is evaporated to dryness in a Pt capsule and ashed. The ash is dissolved in about 20 c.c. of hot water, the solution is evaporated on the water-bath and the residue dried at 120°C. It is then treated with a mixture of 5 c.c. of methyl alcohol and 0·5 c.c. of strong H_2SO_4 and transferred to a 100 c.c. Erlenmeyer flask by means of another 5 c.c. of methyl alcohol. The mixture is allowed to stand for 30 minutes, and then distilled on the water-bath at 80 to 85°C. The distillate is collected in a small flask which is fitted with a double bored cork bearing two tubes, one long and one short, as in a wash-bottle. The longer tube should go to the bottom of the flask beneath the liquid. The shorter tube may conveniently carry a Pt point. Dry H is then passed through the apparatus and the issuing gas ignited. If a green flame is evident in a darkened place boric acid is present. *Detection of formaldehyde.*—Fifty Gm. of the lard is melted with 50 c.c. of water and 10 c.c. of H_3PO_4 1 : 4. Steam is then passed through the mixture, in a distillation apparatus, until 50 c.c. of distillate has been collected ; this is filtered. Two c.c. of fresh milk, free from formaldehyde, is then added to 5 c.c. of this in a test tube, and 7 c.c. of HCl, sp. gr. 1·124, containing 0·2 c.c. of Fe_2Cl_6 solution, 1 : 10, in 100. The mixture is then heated to gentle boiling for about 30 seconds. In presence of formaldehyde a violet colour will be obtained. This may be confirmed by adding excess of AmOH to the rest of the above distillate and evaporating to dryness ; if any notable quantity of formaldehyde is present characteristic crystals of hexamethylenetetramine may be obtained. The residue is dissolved in about 4 drops of water, and one drop, on a micro-slide, is treated with 1 drop of $HgCl_2$ reagent. A precipitate of regular three- or more rayed stars, and later of octahedra, is formed if formaldehyde is present.

Another drop, similarly tested with potassium-mercury iodide solution and a minute quantity of dilute HCl, gives characteristic hexagonal, pale yellow, stellate crystals. The potassium-mercury iodide reagent is prepared by saturating hot 10 per cent. solution of KI with HgI until some of the latter remains insoluble. *Detection of sulphurous acid and sulphites.*—Thirty Gm. of the lard and 5 c.c. of H_3PO_4 1 : 4 are introduced into a 100 Erlenmeyer flask. This is closed with a cork in which a slit has been cut to hold a strip of KI and starch test paper, the end of which to the extent of about 1 cm. is previously moistened with water. If no blue colour appears on the test paper, especially at the juncture of the wet and dry parts, the cork is slightly loosened and the whole warmed on the water-bath for 10 minutes. If no blue colour appears, the flask is taken off the bath, the cork tightened and the contents shaken at intervals during cooling. If no blue colour occurs on the test paper in 30 minutes the fat is free from SO_2. *Detection of salicylic acid and its compounds.*—Four c.c. of alcohol, 20 per cent. and 2 or 3 drops of freshly prepared 0·05 per cent. solution of Fe_2Cl_6 are mixed in a test tube ; then 2 c.c. of the melted lard is run in. After shaking up no violet colour should appear in the lower layer.

Detection of sesame oil.—Five c.c. of the melted fat is dissolved in 5 c.c. of petroleum ether, and treated with 0·1 c.c. (1 : 100 solution in absolute alcohol) and 10 c.c. of HCl 1·19. After well shaking for at least 30 seconds, if sesame oil be present, the lower acid layer will be coloured pink. *Detection of vegetable fats.*—Five c.c. of the melted filtered fat is mixed with 5 c.c. of colourless HNO_3, sp. gr. 1·40, and 5 c.c. of saturated solution of resorcinol in C_6H_6 in a strong stoppered bottle ; after shaking up for 5 seconds no red, violet or green colour should appear. After a time, any colour that forms may be disregarded. *Detection of water and insoluble impurities.*—About 10 Gm. of the well bulked sample of lard is introduced into a colourless test tube 9 cm. long and 18 c.c. capacity, fitted with a rubber cork and thermometer ; the bulb being in the middle of the fat. Heat is cautiously applied until the fat reaches 70°C. If the melted fat is clear less than 0·3 : 100 of water is present. On then raising the temperature to 95°C., cooling and noting the temperature of commencing turbidity, repeating the melting and cooling three times, if all the turbidity temperatures are above 75°C. the lard contains more than 0·3 per cent. of water. If the melted fat is not clear at

95°C. it either contains more than 0·45 per cent. of water, or else foreign solid adulterants. (See also *Y.B.*, **1904,** 107 ; **1905,** 102 ; **1907,** 47, 275 ; **1908,** 103, 104 ; **1910,** 263.)

Linseed Oil, Analytical Examination of. H. R. Jensen. (*Pharm. J.*, 1911 [4], **32,** 839.) The Liebermam colour reaction for the detection of rosin oil in linseed oil is not reliable, since genuine oil contains more or less sitosterol which gives a very similar colour reaction. A very complete series of analyses is given, showing that the ordinary tests applied are not sufficient to detect slight or skilful adulteration. Details of the various tests used are given.

Lubricating Oil, for Motors, Detection of Rosin Oil in. P. Carles. (*Annales des Falsific.*, 1910, **3,** 290.) From 3 to 5 Gm. of the lubricant in a tube is treated with about 5 times its volume of alcohol 60 per cent. The mixture is warmed on the water-bath to 40–50°C. and shaken up to form an emulsion, then the tube is plunged into cold water. As the oily globules separate, the tube is rotated several times on its axis, which causes complete separation. The whole is then thrown on a filter, and the alcoholic filtrate, collected in a porcelain capsule, is gently evaporated on the water-bath only to drive off the alcohol, but not the aqueous residue. This is cooled and treated with methyl sulphate, added drop by drop. In presence of rosin oil a red colour will be obtained. This vanishes quickly with the first drops but becomes more intense and permanent with those following, until 2 or 3 c.c. of the reagent has been added.

Luffa acutangula, Fixed Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1430.) Vernacular names: Pikunkai (Tamil), turi, jurgi (Hindustani), peechangai (Malayalam). The plant is cultivated in most parts of India, chiefly for the green fruit, which is cooked. The fruits, seeds, and leaves are employed in their raw state as an emetic. The seeds, on extraction with ether, yielded 20 per cent. of an oil of light green colour. The expressed oil is yellowish white in colour, and solidified at the ordinary temperature; sp. gr. (d100/100), 0·9363; acid value, 93·7 ; saponification value, 229·2 ; Reichert Meissl value, 13·1 ; iodine value, 40·12 ; m.p. of fatty acids, 44·1°C.

Mangifera indica Seeds, Fat of. J. Sach. (*Pharm. Weekblad.*, 1911 [13] ; *Apoth. Zeit.*, 1911, **26,** 302.) The seed kernels

of *Mangifera indica* contain 5·2 per cent. of fat; m.p. 36°C.; acid value, 12·3; saponification value, 175; iodine value, 54·5; Reichert Meissl value, 0·2. The main constituent is oleodistearin—obtained in fine needles m.p. after recrystallization, 44°C., by adding EtOH to the Et_2O solution of the fat.

Mimusops elengi Seeds, Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29**, 1430.) Vernacular names: Mulsari (Hindustani), magilamaram (Tamil). The flowers contain a volatile oil which is used in perfumery. In Bombay a preserve is made from the fruits. On extraction with ether, the kernels yielded 18·47 per cent. of a yellowish-brown viscid oil. This is used for culinary purposes, for burning, and is extensively employed in medicine for various purposes. The expressed oil has a light yellowish white colour, and "stearine" deposits on standing. Sp. gr. (d 100/100), 0·9129; acid value, 45·5; saponification value, 213·9; Reichert Meissl value, 10·6; iodine value, 66·5.

Oil Fruits, New. C. Grimme. (*Chem. Rev. Fett. Harz. Ind.*, 1910, **17**, 233; *Chem. Zentralb.*, 1910, **2**, 1713.) The seeds of the Brazilian palm *Oenocarpus batava*, known as "*patava*," yield to Et_2O 34·8 of a pale yellow slightly drying oil, known as "*comu oil*." The fruit of another palm known as "*drupas*," a species of *Attalea*, contains three to five edible seeds. These yield to ether 52·9 per cent. of a white solid crystalline fat; m.p. 24·5. The kernels of the seeds of *Virola venezuelensis*, N.O. *Myristicaceæ*, known as "*fruto de cuojo*," yield to Et_2O 74·7 per cent. of a yellowish brown crystalline fat, m.p. 47°C. The seeds of *Virola guatemalensis*, coming into commerce under the name of "*African oil nuts*" and "*noix de dragonier*," yield 51·8 per cent. of a similar fat, m.p. 38·5°C. The kernels of the seeds of *Pongamia glabra* (*Gadelupa indica*, *G. pinnata*, *Dalbergia arborcu*, and *Caju gadelupa*, are all given as synonyms), N.O. *Leguminosæ*, a native of India, S. China, and N. Australia, yield 34·7 per cent. of a dark yellow to pale brown butter-like oil with a bitter taste, m.p. 2°C. The seeds of *Irvingia gabonensis*, N.O. *Simarubaceæ*, yield 38·8 per cent. of a crystalline white fat, m.p. 39·9°C. The West African natives obtain the edible fat known as "*Dika butter, adika fat, oba oil*, and *wild mango oil*," by boiling these seeds with water. The seeds of *Allophyllus racemosus* (*Schmidelia racemosa*), N.O. *Sapindaceæ*, a native of Asia and Oceanea, give 20·2 per cent. of a very hard

fat, m.p. 63°C. The seeds of *Pentadesma butyracea*, N.O. *Guttiferæ*, the West African *butter tree* (also known as *Chlorophora tenuifolia* and *Sideroxylon densiflorum*), yield 46·6 per cent. of white solid fat, m.p. 38·5°C. The seeds are known as "*Kanya nuts*," and the fat is called "*Kanya butter*" or "*Sierra Leone butter*." The seeds of *Garcinia balanse*, N.O. *Guttiferæ*, a native of India, yield 61·8 per cent. of dark brown fluid oil. The fruit of *Calophyllum inophyllum* (*Balsamaria onophyllum*), of the same N.O., a native of India and Africa, are met with in commerce as "*Laurel nuts*," and the seeds are known as "*udilo*" or "*dilo seeds*"; the kernels of these yield 60·4 per cent. of dark green resinous oil with an aromatic odour. *Pará nuts*, *Brazil nuts* the seeds of *Bertholletia excelsa*, N.O. *Lecythiadaceæ*, are widely distributed in S. America, and are well-known. The kernel yields 65·8 per cent. of almost colourless oil which easily goes rancid. The kernels of the seeds of *Poga oleosa*, N.O. *Anisophylleoidaceæ*, native of the West coast of Africa, known as "*Inoy nuts*," yield 55·3 per cent. of a mobile pale yellow non-drying oil. The seeds of *Telfairia pedata* (*Joliffa africana*), N.O. *Cucurbitaceæ*, yield 35·2 per cent. of pale yellow oil. *Telfairia occidentalis* seeds, from West Africa, yield 32 per cent. of drying oil. The characters of all the above oils are given in the original in tabular form.

Oils and Fats, Indian. A. Kesava-Menon. (*J. Soc. Chem. Ind.*, 1910, **29**, 1428.) The physical and chemical characters of the following fats are described from authentic samples. Cow ghee; buffalo ghee; oils of the seeds of *Bassia butyracea*, *B. latifolia*, *B. longifolia*, *B. malabarica*, *Jatropha glandulifera*, *Luffa acutangula*, *Mimusops elengi*, *Pithecolobium dulce*, *Psoralea corylifolia*, *Sapindus trifoliatus*, *Thespesia populnea* and *Veronica anthelmintica*. *Bassia latifolia* yields "mowrah" oils and other species of *Bassia* and also *Payena* are indiscriminately called "mowrah." The oil of *Jatrophra glandulifera* is used as a purgative, and externally as a liniment for rheumatism and paralysis. The flowers of *Mimusops elengi* contain an essential oil which is used in perfumery. *Psoralea corylifolia* seeds are used as a remedy for skin diseases. Imported under the name of "bawchan" seeds, the seeds of *Veronica anthelmintica* are similarly used for skin diseases and for preserving woollen fabrics from insects. In India none of these oils are prepared in any other than small quantities for medicinal use; although some could

be produced locally in quantity. Details of the more important of these oils will be found under the respective headings.

Oils, Edible, Coloured with Auramine O. — Frehse. (*Annales de Falsific.*, 1910, **3**, 293.) The colour of table oils is sometimes "improved" by the addition of the "aniline" dye auramine O (amido-tetramethyl-para-amido-diphenyl-methane hydrochloride). One c.c. of the oil is treated with 20 c.c. of alcoholic soda, 8 : 100, and a little Zn dust. The mixture is then boiled for 30 minutes under a reflux condenser, cooled, and transferred to a separator containing 20 c.c. of pure C_6H_6. After shaking up, water, 50 c.c., is added. When separation is complete the C_6H_6 layer is decanted, filtered and evaporated. The residue when treated with glacial acetic acid gives a fine blue colour, deepening on warming, if auramine be present.

Oil, Fats and Waxes, Official. C. A. Hill. (*Pharm. J.*, 1910 [4], **31**, 780.) The adoption of 40°C. as the standard temperature for the determination of the η_D of oils is suggested instead of 15°C. as proposed. The η_D of beeswax taken at 80°C. about 1,44, is a useful factor, since that of ceresin is much lower, 1,43. The lower limit of iodine value for almond oil should be 93, and the higher limit for the saponification value 195. The iodine value of linseed oil is often above 190; this figure need not be given, but a requirement of "not less than 170" inserted. With castor oil the higher iodine value might be 90; and the acetyl value, 148–150, should be maintained.

Oils, Fats and Waxes of the B.P., Suggested Monographs for. F. C. J. Bird and E. W. Lucas. (*Pharm. J.*, 1910 [4], **31**, 468.) With the view of eliciting opinions, the authors suggest monographs for the official oils, fats and waxes, the most important factors of which are given below :—

Adeps.—The purified fat of the hog, *Sus scrofa*. *Characters and tests.*—A soft white homogeneous substance, having a faint but not rancid odour. Saponification value, 192 to 198; iodine value, 51 to 63; free acid, not exceeding 0·6 per cent.; refractive index at 60°C., 1,4530–1,4550; lard melts at 38° to 41°C., forming a clear liquid, which does not deposit water on standing. Distilled water boiled with lard should not acquire an alkaline reaction, neither should it, when filtered and acidified with HNO_3, yield any reaction with $AgNO_3$, T.S.

If 1 Gm. of melted and filtered lard be warmed and shaken with 5 c.c. N/1 alcoholic KOH in a test-tube, a clear solution should be formed, which should not become turbid when mixed with 4 c.c. of a mixture of glycerin and water (equal volumes) and cooled to 15°C. (absence of paraffin). Twenty c.c. of melted and filtered lard, with 10 c.c. HCl and 0·1 Gm. of cane sugar, when vigorously shaken, should not acquire a crimson colouration (absence of sesame oil).

Adeps Benzoatus.—Lard, 100; Sumatra benzoin (in coarse powder), 3. Melt the lard, add the benzoin, and maintain at a temperature of 60°C. for 1 hour, stirring frequently; remove the residue of benzoin by straining; stir the benzoated lard until nearly cold.

Adeps Lanæ (Wool fat, Lanolin).—The purified fat of sheeps' wool freed from water. *Characters and tests.*—A yellowish, tenacious, unctuous substance; almost inodorous; m.p. about 40°C. 0·1 Gm. of wool-fat dissolved in 5 c.c. of $CHCl_3$ with 0·5 c.c. of acetic anhydride, poured upon the surface of 5 c.c. of H_2SO_4 in a test-tube, develops at the point of contact a purplish-brown ring, the upper layer of which gradually becomes green. If 0·2 Gm. be dissolved in 10 c.c. of Et_2O and 2 drops of phenolphthalein, T.S., be added, a colourless liquid should be obtained (absence of free alkali); if 1 drop of N/1 KOH be added, a deep red colour should appear (absence of free fatty acids). When incinerated, with free access of air, not more than 0·3 per cent. of ash should be left. Heated with solution of KOH, no odour of NH_3 should be evolved (absence of organic nitrogenous matter).

Adeps Lanæ Hydrosus (Hydrous Wool-fat; Lanolin).—Wool-fat, 70; distilled water, 30. *Characters and tests.*—10 Gm. heated on a water-bath, with stirring, until the weight is constant, should not yield less than 7 Gm. of residue, which should answer to the tests for wool-fat

Cera Alba.—Yellow beeswax, bleached. *Characters and tests.*—Hard, nearly white, translucent masses. 5 Gm. heated with 20 c.c. of 96 per cent. alcohol until evenly distributed should require for neutralization from 1·5 to 2·2 c.c. N/1 alcoholic KOH, using phenolphthalein indicator (limit of free acids). In other respects it should respond to the tests for yellow beeswax.

Cera Flava.—Prepared from the honeycomb of the hive bee, *Apis mellifica*, Linn. *Characters and tests.*—A yellowish-brown solid, having an agreeable honey-like odour, somewhat

brittle when cold, but becoming plastic by the heat of the hand. Fracture granular, not crystalline. Sp. gr. 0·958 to 0·970; m.p. 61° to 64°C. Not more than 1 per cent. should be soluble in boiling water (absence of honey). Five Gm. boiled for 10 minutes with 80 c.c. of 10 per cent. NaOH, the loss by evaporation being replaced, should not, when cooled and filtered through a plug of asbestos, become turbid on the addition of excess of hydrochloric acid, (absence of fat, fatty acids, Japan wax and resin) (see *Y.B.*, **1910,** 95). Five Gm. heated with 20 c.c. of 96 per cent. alcohol, until evenly distributed, should require for neutralization from 1·5 to 2·0 c.c. of N/ alcoholic KOH with phenolphthalein indicator. Care must be taken that the wax remains in a melted condition. Upon the further addition of 20 c.c. of N/ alcoholic KOH and well boiling for 75 minutes under a reflux condenser, not less than 6·2 nor more than 6·8 c.c. should be found to have been used up, on titrating back with N/ H_2SO_4. When 5 Gm. are saponified with 30 c.c. N/2 alcoholic KOH, the alcohol evaporated and the residue dissolved in 20 c.c. of glycerin by means of a water-bath should yield a clear or translucent solution on the addition of 80 c.c. of boiling distilled water (absence of paraffin and other waxes). The alcoholic KOH solution must be prepared with 96 per cent. alcohol.

Cetaceum.—A solid fatty substance obtained from various species of whales. *Characters and tests.*—In translucent, pearly white, glistening masses, with a leafy crystalline structure; slightly unctuous to the touch; almost odourless. Reducible to powder by the aid of a little 60 per cent. alcohol. Sp. gr. 0·950 to 0·960; m.p. 43° to 50°; iodine value, 3 to 3·4; saponification value, 125 to 126. Spermaceti dissolves in hot fats and fixed oils, but on cooling the greater proportion separates in thin laminæ. Five Gm. melted with 20 c.c. of 90 per cent. alcohol and two drops of phenolphthalein, T.S., should require not more than one drop of N/ KOH to produce a permanent red colour (limit of acidity). If 1 Gm be boiled with 10 c.c. of 90 per cent. alcohol for 1 minute and the mixture cooled and filtered at 0°C., the filtrate may become opalescent, but should not afford a precipitate on pouring into water (absence of stearic acid).

Oleum Amygdalæ.—The oil expressed from bitter or sweet almonds. *Characters and tests.*—Pale yellow, nearly inodorous, with a bland, nutty taste. Saponification value, 188

to 200; iodine value, 95 to 100; sp. gr. 0·915 to 0·920; free acid not exceeding 2 per cent.; refractive index, at 15°C., 1,4720 to 1·4730. Exposed for 3 hours it remains clear at 10°C., and does not congeal until about −18°C. Five c.c. with 1 c.c. of the following Bieber's reagent strongly agitated in a stoppered tube for 1 minute should form a whitish mixture with only the very slightest tinge of red or brown. After some hours a white solid matter, sometimes tinged with green, separates, the lower acid layer remaining colourless. *Bieber's Reagent.*—Equal parts of H_2SO_4, red fuming HNO_3, and distilled water, mixed very cautiously. Must be kept cool during mixing and must be fresh.

Oleum Lini.—The oil expressed from linseed. *Characters and tests.*—Yellowish brown, with a distinct odour and bland taste. Saponification value, 187 to 195; iodine value, 170 to 190; sp. gr. 0·930 to 0·940; free acid, not exceeding 1·5 per cent.; refractive index, 15°C., 1,4832 to 1,4844. Unsaponifiable matter under 1 per cent. It does not congeal above −20°C. It gradually thickens by exposure to the air, forming a hard, transparent varnish when spread in a thin layer. Two c.c. of linseed oil warmed and shaken with an equal volume of acetic anhydride and cooled on the addition of 2 drops of H_2SO_4, sp. gr. 1·53, should not give rise to a violet colouration (absence of resin and resin oils).

Oleum Morrhuæ.—The oil expressed from the fresh liver of the cod, *Gadus morrhua*, Linn., at a temperature not exceeding 85°C., and from which solid fat has been separated by filtration at about −5°C. *Characters and tests.*—Pale yellow, with a slightly fishy, but not rancid odour, and a bland, fishy taste. Saponification value, 179 to 192; iodine value, 155 to 173; sp. gr. 0·920 to 0·930; free acid, not exceeding 1·5 per cent.; refractive index, at 15°C., 1,4800 to 1,4830. No separation of solid fat should take place on exposure of the oil to a temperature of 0°C. for 3 hours. The unsaponifiable matter should not exceed 1·5 per cent. One c.c. of oil, dissolved in 10 c.c. of CS_2, should give a violet-blue colouration when gently shaken with one drop of H_2SO_4.

Oleum Olivæ.—The oil expressed from the ripe fruit of *Olea europæa*, Linn. *Characters and tests.*—Pale yellow to greenish-yellow, with a faint but not rancid odour, and a bland taste. Saponification value, 188 to 197; iodine value, 79 to 87; sp. gr. 0·915 to 0·918; free acid, not exceeding 3·5 per cent.; refractive index, at 15°C., 1,4698 to 1,4713. When maintained

for some time at 10°C. it may assume a pasty consistence, and, at a lower temperature, may become a granular mass. Two c.c. of oil mixed with 1 c.c. of amyl alcohol and 1 c.c. of a 1 per cent. solution of S in CS_2, when placed in a test tube immersed in boiling water should not develop a red colour in 15 minutes (absence of cotton-seed oil). If a mixture of 2 c.c. of oil and 1 c.c. of HCl (sp. gr. 1·18), containing 1 per cent. of cane sugar, be shaken for half a minute, and allowed to stand for 5 minutes, the acid layer should not become pink (absence of sesame oil). On shaking 2 c.c. of oil and 2 c.c. of HNO_3 (sp. gr. 1·375) the oil should not become orange or reddish brown, and after 6 hours should change into a yellowish-white solid mass and an almost colourless liquid (absence of cotton and other seed oils). One c.c. of oil and 15 c.c. of alcoholic N/KOH boiled for 20 minutes under a reflux condenser and kept for 24 hours at a temperature not exceeding 15°C., should not become cloudy nor deposit crystals of potassium arachidate (absence of arachis oil).

Oleum Ricini.—The oil expressed from the seeds of *Ricinus communis*, Linn. *Characters and tests.*—Viscid; nearly colourless, or with a yellowish tinge; slight odour. Taste at first bland, but afterwards acrid and unpleasant. Saponification value, 177 to 187; iodine value, 83 to 89; sp. gr. 0·958 to 0·970; free acid, not exceeding 2 per cent.; refractive index, at 15°C., 1,4790 to 1,4805. Soluble in all proportions of absolute alcohol; in 90 per cent. alcohol 1 : 3·5. Ten c.c. of oil shaken with 7 c.c. of petroleum ether in a stoppered glass cylinder forms a clear mixture at 15°C. On shaking with 3 c.c. more petroleum ether a turbid mixture results, which becomes clear when maintained for 5 minutes at 21°C. The mixture becomes turbid when the temperature falls below 18°C. (absence of other fixed oils).

Oleum Theobromatis (Cacao butter).—A solid fat expressed from the seeds of *Theobroma cacao*, Linn. *Characters and tests.*—Refractive index, at 60°C., 1,4480 to 1,4500. Sp. gr. 0·990 to 0·998; saponification value, 188 to 195; iodine value, 35·5 to 37·5; m.p. 30° to 33°C.; free acid not exceeding 1 per cent. Is somewhat brittle at ordinary temperatures, but softens at 25°C. If 1 Gm. be dissolved in 3 c.c. of ether in a test tube, at 17°C., and the tube be placed in water at 0°C., the liquid should neither become turbid nor deposit a granular or flaky mass in less than 3 minutes, and if the mixture, after congealing, be exposed to a temperature of 15°C. it should gradually afford a clear solution (absence of other fats and waxes). In ascertaining

the specific gravity and melting point 72 hours should elapse between the time of melting and determining the constants.

Paraffinum Durum.—A wax-like mixture of solid hydrocarbons. *Characters and tests.*—Colourless, crystalline, more or less translucent, inodorous, tasteless, slightly greasy to the touch. Sp. gr. 0·820 to 0·940 ; m.p. 54° to 60°C. Five c.c. of alcohol shaken with 5 Gm. of melted paraffin should not redden blue litmus paper. Five Gm. heated burns with a luminous flame, leaving no weighable ash.

Paraffinum Liquidum.—A mixture of liquid hydrocarbons. *Characters and tests.*—Colourless, odourless, tasteless and transparent, not fluorescent. Sp. gr. 0·860 to 0·885. Four c.c. of liquid paraffin, 2 c.c. of absolute alcohol, and 2 drops of a clear saturated solution of lead oxide in solution of sodium hydroxide should remain colourless when kept at 70°C. for 10 minutes (absence of sulphur compounds). Ten c.c. of alcohol boiled with 5 c.c. of liquid paraffin should not redden blue litmus paper.

Paraffinum Molle.—A semi-solid mixture of hydrocarbons. *Characters and tests.*—White or yellow, translucent, soft, unctuous to the touch. No liquid should separate on keeping. Sp. gr. at the m.p. 0·840 to 8·870 ; m.p. 36° to 42°C. On heating to 80°C. no unpleasant odour should be developed. Ten c.c. of EtOH boiled with 5 Gm. of soft paraffin should not redden blue litmus paper. Ten Gm. boiled with 20 c.c. of NaOH, T.S., for 10 minutes and the aqueous layer separated, should yield no precipitate or oily matter on acidifying with H_2SO_4 (absence of fixed oils, fats and resin). Five Gm. when heated burns with a luminous flame, leaving no weighable ash.

Sevum Præparatum.—The purified internal fat of the abdomen of the sheep, *Ovis aries*, Linn. *Characters and tests.*—A white solid, nearly inodorous fat ; bland taste. Saponification value, 192 to 195 ; iodine value, 33 to 46 ; m.p. 45° to 50°C. Refractive index, at 60°C., 1.4491 to 1.4510. Free acid not exceeding 1 per cent.

Determination of Saponification Value.—*Alcoholic* KOH. —Dissolve about 40 Gm. of KOH in 1 litre of 90 per cent. alcohol in the cold ; stand for 24 hours and filter. (*a*) Weigh from 1·5 to 2 Gm. of the oil or fat in a flask of 200 c.c. capacity ; add 25 c.c. of alcoholic KOH solution from a burette, and heat on a water-bath under a reflux condenser for 30 minutes. Allow to cool, add 1 c.c. of phenolphthalein test-solution and titrate the amount of uncombined alkali with semi-normal hydrochloric

acid. (*b*) At the same time treat 25 c.c. of the alcoholic KOH solution in a similar manner. The *saponification value* (the number of milligrammes of KOH required for complete saponification of 1 Gm. of the substance) may be deduced from the following formula —

$$\frac{(b-a) \times 0{\cdot}028 \times 1{,}000}{\text{Weight of oil or fat taken}}.$$

Determination of Free Acid.—Mix 10 Gm. of oil or fat with 50 c.c. of 90 per cent. alcohol, and warm if necessary ; add 1 c.c. of phenolphthalein test solution and titrate with N/10 KOH, shaking constantly meanwhile. The percentage of free acid, calculated as oleic acid, may be deduced from the following formula —

$$\frac{(\text{C.c. of N/10 KOH absorbed}) \times 0{\cdot}028 \times 100}{\text{Weight of oil or fat taken}}.$$

Determination of Iodine Value.—*Iodine solution.*—Dissolve 13 Gm. of I in 1 litre of glacial acetic acid ; titrate with N/10 sodium thiosulphate solution ; note the titer value. Pass chlorine gas, washed and dried, into the solution until the titer value in the presence of excess of KI is exactly doubled. Preserve in a stoppered amber bottle in a cool, dark place.

KI solution.—Dissolve 100 Gm. of KI in 1 litre of distilled water. Preserve in a stoppered amber bottle.

Starch solution.—Mix 1 Gm. of starch with 1 litre of distilled water ; strain through muslin, and boil for 2 minutes. Filter. This solution must be freshly prepared.

Weight of oil or fat to be taken when determining the iodine value.—Lard, suet, and oil of theobroma, 0·8 to 1 Gm. ; almond, castor and olive oil, 0·3 to 0·4 Gm. ; cod-liver and linseed oil, 0·15 to 0·18 Gm.

Time required for absorption.—Lard, suet, oil of theobroma, almond, castor, and olive oil, 1 hour ; cod-liver and linseed oil, 2 hours.

(*a*) Place the specified weight of oil or fat in a stoppered bottle of 800 c.c. capacity, add 10 c.c. of CCl_4 and dissolve ; add 25 c.c. of I solution from a burette ; insert the stopper, previously moistened with KI solution, and keep in a dark place at about 17°C. At the expiration of the time specified add 20 c.c. KI solution and 500 c.c. of distilled water. Shake and titrate with N/10 thiosulphate solution, using starch indicator.

(*b*) At the same time treat 25 c.c. of the iodine solution in a similar manner. The *iodine value* (percentage of iodine absorbed) may then be deduced from the following formula —

$$\frac{(b-a) \times 0{\cdot}01259 \times 100}{\text{Weight of oil or fat taken}}.$$

Determination of Unsaponifiable Matter.—Boil 5 Gm. of the oil or fat with 50 c.c. of N/1 alcoholic KOH on a water-bath under a reflux condenser for 30 minutes. Transfer the contents of the flask to a porcelain dish and evaporate the EtOH on a water-bath. Dissolve the resulting soap in about 100 c.c. of hot distilled water, cool, and transfer to a separator. Add 50 c.c. Et_2O and mix thoroughly. Allow to separate. Transfer the soap solution to another separator, and again extract with 50 c.c. Et_2O. Mix the ethereal solutions and wash with three portions, 20 c.c. each, of distilled water. Transfer the ethereal solution to a tared flask, evaporate the Et_2O. and dry the residue at 100°C. The weight of residue × 20 gives the percentage of unsaponifiable matter.

Olive Oil. W. B. Cowie. (*Pharm. J.*, 1910 [4], **31,** 794.) Six specimens of olive oil are reported on. All are within the limits suggested by Lucas and Bird for sp. gr. and η_D; two of these contained arachis oil, two contained sesame oil, and one probably contained palm oil olein. Two were very rank in odour. The iodine numbers were all with the proposed limits. Three exceeded the limit for acidity.

Olive Oil, Detection of Arachis Oil in. (*Southall's Report*, 1911, **19,** 13.) Archbutt's modification of Rénard's test is found to be more accurate and sensitive than with Bohrisch's method, or the test suggested by Lucas and Bird. The first named process will detect the presence of 10 per cent. of arachis nut oil in olive oil; the other two processes just show the presence of 15 per cent. (See also *Y.B.*, **1907,** 115.)

Olive Oil, Detection of Cotton Seed in. (*Southall's Report*, 1911, **19,** 13.) Four samples of olive oil have been rejected, found to be adulterated with cotton-seed oil, although giving no reaction with Halphen's test. It is probable that the cotton-seed oil used had been heated, a process which destroys the particular substance giving the Halphen reaction test, the colour-

ation produced by shaking with an equal volume of nitric acid (sp. gr. 1·375) indicates the presence of the sophistication.

The results obtained for these adulterated samples were as follows :—

Specific gravity . .	0·9155	0·9160	0·9165	0·9160
Free acid as oleic acid	5·5%	5·5%	5·99%	6·00%
Iodine absorbed . .	84·8%	85·1%	85·45%	84·67%
Saponification value .	193·9	193·5	188·2	191·2
Halphen test . . .	No reaction in any case.			
B.P. silver test . .	slight darkening	slight darkening	pronounced darkening	pronounced darkening
Nitric acid colour .	coffee-brown	coffee-brown	brown	brown

For genuine samples the following range of figures was obtained :—Sp. gr. 0·915 to 0·917 ; free acid as oleic acid, 0·87 to 8·51 per cent. ; iodine absorbed, 79·05 to 85·67 per cent. ; saponification value, 188·0 to 195·7.

Papilionaceous Seeds, Fixed Oils of. C. Grimme. (*Chem. Rev. Fett. Harz.*, 1911, **18**, 33, 77.) The following figures relate to the oil extracted from the seeds by means of Et_2O. *Lupinus angustifolius*.—Yield 5·56 per cent. of a brown, odourless non-drying oil ; sp. gr. 0·920 at 20°C. ; congealing point, —10°C. ; $\eta_{D20°}$ 1,4725 ; acid value, 21·6 ; ester value, 164·6 ; Wij's value, 83·2. *Lupinus luteus*.—Yield, 5·41 per cent. of dark brown odourless, non-drying oil : sp. gr. 0·920 at 20°C. ; congealing point —5°C ; η_{D20} 1,4776 ; acid value, 16·5 ; saponification value, 185 ; Wij's value, 68·3. *Anthyllis vulneraria*.—The dark green, non-drying oil has the sp. gr. 0·916 at 25°C. ; congealing point, —18°C. ; $\eta_{D30°}$ 1,4756 ; acid value, 13·1 ; saponification value, 189 ; Wij's value, 71·6. *Melilotus albus* seeds yield 6·63 per cent. of dark brown, aromatic viscous oil ; sp. gr. 0·931 at 25°C. ; congealing point, —10°C. ; $\eta_{D30°}$ 1,4862 ; acid value, 15·5 ; saponification value, 187·9 ; Wij's value, 71·4. *Melilotus officinalis* seeds give 7·83 per cent. of reddish brown very viscous oil with a coumarin odour ; sp. gr. 0·928 at 25°C. ; congealing point, —10°C. ; $\eta_{D30°}$ 1,4760 ; acid value, 86·1 ; saponification value, 193·2 ; Wij's value, 69·2. *Medicago sativa* seeds contain 7·63 per cent. of odourless, brown, non-drying oil ; sp. gr. 0·922 at 25°C. ; congealing point, —12°C. ; $\eta_{D30°}$ 1,4766 ; acid value, 14·7 ; saponification value, 193·4 ; Wij's value, 78·9. *Trifolium incarnatum* seeds give an odourless, slight drying, dark brown oil ; sp. gr. 0·910 at 25°C. ; congealing point, —9°C. ; $\eta_{D30°}$ 1,4723 ; acid value, 21·4 ; saponifi-

cation value, 181·3; Wij's value, 61·6. (See also *Y.B.*, **1910,** 173.) *Trifolium pratense* seeds gave 14·78 per cent. of greenish-brown, odourless, slightly drying oil; sp. gr. 0·914 at 25°C.; congealing point, −14°C.; $\eta_{D30°}$ 1,4732; acid value, 8·3; saponification value, 191·8; Wij's value, 64·1. (See also *Y.B.*, **1910,** 174). *Trifolium hybridum* seeds contain 6·42 per cent. of dark green slightly drying oil; sp. gr. 0·918 at 25°C.; congealing point, −14°C.; $\eta_{D30°}$ 1,4775; acid value, 13·4; saponification value, 187·2; Wij's value, 65·9. *Trifolium repens* seeds yield 6·81 per cent. of dark brown, odourless, faintly drying oil; sp. gr. 0·910 at 25°C.; congealing point, −16°C.; $\eta_{D30°}$ 1,4745; acid value, 10·5; saponification value, 189·4; Wij's value, 68·5. *Trifolium agrarium* seed oil is dark brown, odourless, and non-drying; sp. gr. 0·922 at 25°C.; congealing point, −15°C. $\eta_{D30°}$ 1,4757; acid value, 9·5; saponification value, 188·4; Wij's value, 75·9. *Trigonella fœnum græcum* seeds give 5·98 per cent. of a brown, aromatic, bitter, slightly drying oil; sp. gr. 0·928 at 25°C.; congealing point, −12°C.; $\eta_{D30°}$ 1,4738; acid value, 20·6; saponification value, 183·4; Wij's value, 81·9. *Lotus corniculatus* oil is reddish brown and faintly drying; sp. gr. 0·930 at 25°C.; congealing point, −14°C.; $\eta_{D30°}$ 1,4729; acid value, 12; saponification value, 190·7; Wij's value, 70. *Galega officinalis* seeds yield 3·8 per cent. of dark olive green slightly drying oil; sp. gr. 0·921 at 25°C.; congealing point, 19°C.; $\eta_{D30°}$ 1,4728; acid value, 33·5; saponification value, 175·1; Wij's value, 61·8. *Ornithopus sativus* fruits contain 8·9 per cent. of dark greenish brown, odourless, mobile, non-drying oil; sp. gr. 0·918 at 20°C.; congealing point, −17°C.; $\eta_{D20°}$ 1.4751; acid value, 19·4; saponification value, 185; Wij's value, 69. *Onobrychis sativa* seeds give 7·18 per cent. of odourless dark brown mobile non-drying oil; sp. gr. 0·915 at 25°C.; congealing point, −11°C.; $\eta_{D30°}$ 1,4770; acid value, 13·2; saponification value, 175·2; Wij's value, 67. The oil of the white lupin, *Lupinus albus* amounts to 6·27 by Et_2O extraction. It is pale brown, odourless and non-drying; at the ordinary temperature it deposits a considerable amount of stearin on standing. Sp. gr. 0·920 at 20°C.; congealing point, −9°C.; $\eta_{D20°}$ 1.4742; acid value, 20·5; saponification value, 192·8; Wij's value, 61·6.

Payena oleifera, Oil of Seeds of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1429.) Known as *kansive* oil, the fat of the seeds of this Burmese tree is sold in India as *mowrah* oil, as

well as that of the various *Bassias*. Payena fat has the sp. gr. 0·9033 at 100/100°C. ; m.p. 29·1 ; acid value, 54 ; saponification value, 183·9, 185 ; Reichert-Meissl value, 1·86 ; iodine value, 58·6.

Peach Kernel Oil. (*Evans' Analyt. Report*, **1910,** 55.) Several samples of this oil examined in the past year, had an unduly high acid value, ranging from 4·2 to 11·2, although giving no indication of rancidity. The acid values observed for recently expressed oils have ranged from 2·5 to 3·5.

An adulterated sample was examined, with sp. gr. 0·923 ; refraction figure, +20° ; acid value, 5·6 ; iodine value, 122·8 ; saponification value, 189. Sesame oil was present, with probably hemp seed, or sunflower seed oil. (*See* also *Y.B.*, **1904,** 22 ; **1908,** 154.)

Pithecolobium dulce Fruit, Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1430.) Vernacular names : Vilati (Hindustani), amli (Bombay), korukapilly (Tamil). *Pithecolobium dulce* was introduced from Mexico and is now cultivated throughout India, especially along the railway lines of the Madras Presidency. The pulp of the fruit on extraction with ether yielded 18·22 per cent. of a yellowish white oil, with a bean-like odour ; solidified at a temperature of 15°C. The expressed oil is yellowish white, and very viscous, and "stearine" deposits on standing. The oil has the following characters : Sp. gr. (100/100), 0·9106 ; acid value, 63·9 ; saponification value, 205·9 ; Reichert-Meissl value, 8·41 ; iodine value, 56·60.

Psoralea corylifolia Oil. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1431.) Vernacular names : Bavanchi (Hindustani), bakuchi (Uriya), karguva arishi (Tamil).

Psoralea corylifolia is a common herbaceous weed found in the plains from the Himalayas, through India to Ceylon. The seeds are usually imported into this country as an oil seed under the name of Bawchan seed. They are used in India for the treatment of cutaneous affections, and as a laxative and stimulant.

On extraction with Et_2O they yielded 20·15 per cent. of a thick reddish brown oil with a pleasant and very strong aromatic colour. The expressed oil is clear, and of a light brown colour, and "stearine" deposits on standing.

The following characters were ascertained : Sp. gr. (100/100°C.)

0·9107 ; acid value, 39·18 ; saponification value, 204·6 ; Reichert Meissl value, 6·9 ; iodine value, 79·9.

Rice Oil, Characters of. M. Tsujimoto. (*Chem. Rev. Fett. Harz.*, 1911, **18,** 111.) Rice bran yields to petroleum ether a greenish yellow oil, which is a commercial article : Sp. gr. 0·9273 at 15°C. ; acid value, 34·75 ; saponification value, 184·87 ; Wij's value, 107·6 ; $\eta_{D20°}$ 1,4742 ; unsaponifiable constituents, 4·78 per cent. The last appears to be mainly a phytosterin. The fatty acids consist of palmitic acid, 20 per cent. ; oleic acid, 35 per cent. ; isolinolic acid, 35 per cent.

Sapindus trifoliatus Seeds, Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1431.) The kernels on extraction with Et_2O yielded 44·67 per cent. of a semi-solid yellow oil. The expressed oil had a dirty brown colour. It solidified completely at the ordinary temperature and exhibited a characteristic odour. Sp. gr. 100/100°C., 0·8542 ; acid value, 42·75 ; saponification value, 191·8 ; Reichert Meissl value, 1·61 ; iodine value, 58·58. The fat is employed medicinally, but its high price precludes its general use. The pericarps are very rich in saponin.

Soap, Hard. (*Southall's Report*, 1911, **19,** 29.) The following results show the great variation in the soap offered commercially as "Sapo durus." Iodine absorbed by mixed fatty acids, 50·8, 82·08, 91·1, 65·9, 64·4 per cent. ; mean molecular weight of mixed fatty acids, 253·1, 294·1, 283·0, 249·4, 248·7 per cent. The low figures found in some cases both for "iodine absorbed" and for "mean molecular weight" point to the probable use of coco-nut oil.

Soya Beans, Fixed Oil of. (*Evans' Analyt. Notes*, **1910,** 71.) Two specimens had the following characters : Crude oil : Sp. gr., 0·927 ; iodine value, 129 ; saponification value, 193·1 ; $\eta_{D15°}$ 1,4759 ; acid value, 3·8. Refined oil : Sp. gr. 0·926 ; iodine value, 128·3 ; saponification value, 194·1 ; $\eta_{D15°}$ 1,4755 ; acid value, 6·0. The oils were semi-drying, and did not congeal at 0°C.

Spermaceti. (*Evans' Analyt. Report*, **1910,** 71.) Genuine samples have fallen between the following limits : Sp. gr., 0·950 to 0·960 ; saponification value, 123 to 129 ; m.p. 43° to 47°. A sample of Californian spermaceti gave : Sp. gr. 0·938 ; saponifi-

cation value, 122·5; iodine value (Wij), 3·5; m.p. 45°. An adulterated sample gave: Sp. gr. 0·922; saponification value, 100; m.p. 45°. Paraffin was present.

Sperm Oil, Adulterated. (*Southall's Report*, **1911, 19,** 16.) A specimen of sperm oil has been met with which was adulterated, probably with a mixture of mineral oil and a fatty oil.

	Normal Samples.	Adulterated Sample.
Sp. gr.	0·880 to 0·884	0·905
Saponification value	124·6 to 131·4	126·7
Iodine absorbed	81·74 to 84·59%	80·95%
Unsaponifiable matter	35·11 to 36·97%	43·80 %
Fatty acids	61·02 to 62·95%	54·02%
Volatile at 100°C.	—	14·7%

Thespesia populnea Seeds, Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1431.) Vernacular name: Puvaras (Malayalam). *Thespesia populnea* grows in the coast forests of India, Burma, the Pacific Islands, the Andamam Islands, and Ceylon. It is largely cultivated along the roadside, especially in Madras. The tree is known in India as the tulip or portia tree. It is said to yield a gum and the capsules and flowers are said to give a yellow dye. The pulp of the seeds on extraction with Et_2O yielded 41·7 per cent. of a very viscid reddish brown oil possessing a characteristic odour. The expressed oil is dark red and of a syrupy consistence; on standing "stearine" deposits. The oil is used in India in the treatment of cutaneous affections. Sp. gr. 100/100°C., 0·9018; acid value, 48·10; saponification value, 201·4–204·0; Reichert Meissl value, 5·9; iodine value, 71·5.

T'ung Oil, Chinese. A. Kreikenbaum. (*J. Ind. Eng. Chem.*, 1910, **2,** 205.) Published data on the characters of T'ung oil are misleading, since Japanese wood oil has, in some instances, been confused with Chinese T'ung oil. The following are average characters: Sp. gr. 15/15°C., 0·941; acid value, 4·4; saponification value, 191; iodine value, 170. (These figures approximate with those recorded in *Y.B.*, **1908,** 8.)

Vernonia anthelminitica Seeds, Oil of. A. Kesava-Menon. (*J.S.C.I.*, 1910, **29,** 1431.) Vernacular names: Vapachi (Hindustani), kattugirakam (Malayalam). *Vernonia anthelminitica* occurs throughout India to Ceylon and Malacca. The seeds are said to possess powerful anthelminitic and diuretic properties, and

are also used as an ingredient of a powder prescribed for snake bites. They are used for the treatment of cutaneous affections and for preserving textile fabrics from the attacks of insects. In India, the oil is never prepared for sale. The seeds on extraction with Et_2O yielded 18·25 per cent. of a dark brown coloured and strong smelling oil with some resinous matter. The expressed oil is of a light yellow colour and very viscid; "stearine" deposits on standing. Sp. gr. 100/100°C., 0·9168; acid value, 58·2; saponification value, 202·88; Reichert Meissl value, 7·88; iodine value, 71·00.

Wax, to Determine the Density of. E. Richter. (*Apoth. Zeit.*, 1911, 26, 187.) The best way to obtain the small pellets for floating is to drop the melted wax from the least possible height into a tall test glass filled with alcohol 50 per cent.; they are then left exposed to the air for 24 hours. To determine the density a mixture of suitable proportions, say alcohol 40 c.c., water 140 c.c., is prepared and some of the pellets introduced into the mixture. Alcohol is then added, 5 c.c. at a time, until the pellets begin to sink. The sp. gr. of the liquid is then determined. Then water is added, also 5 c.c. at a time, until the wax begins to rise; the sp. gr. of the liquid is again taken. The mean of the two sp. gr. is taken as being that of the wax.

Wax, Saponification of, in Sterilizing Apparatus. A. Wichmann. (*Pharm. Zentralh.*, 1911, **52**, 363.) One Gm. of wax is introduced into a strong dry flask with 10 c.c. of absolute EtOH. The flask is closed with a well secured cork, then heated for 5 minutes in the sterilizer, until the wax is dissolved in the EtOH. The liquid is rotated to mix it without touching the cork. After cooling for 3 minutes, the flask is cautiously opened and the free acid titrated, in the usual manner, with N/2 KOH solution and phenolphthalein indicator. Then a further 20 c.c. of the N/2 KOH is run in, the flask is again securely corked, and heated for 25–30 minutes in the sterilizer, the liquid being well rotated every 5 minutes. After cooling for 3 minutes, the flask is cautiously opened, and the remaining uncombined alkali titrated with N/2 HCl. The results obtained compare favourably with those of other methods, and the saving of time is very material.

Waxes, Coniferous, Further Investigation of. J. Bougault. (*J. Pharm. Chim.*, 1911, **3**, 101.) Thapsic acid has now been

definitely isolated and identified as a constituent of the wax of *Juniperus sabina*, and sabinic acid has been found in the saponification products of the wax of *Thuja occidentalis*. (See also *Y.B.*, **1909,** 35; **1910,** 152.)

GLUCOSIDES AND SUGARS

Agrostemma githago Seeds, New Saponin in. J. Brandl, —Mayr and —Vierling. (*Apoth. Zeit.*, 1910, **25,** 500.) A new saponin, agrostemmic acid, has been isolated from the crude saponin extracted by Kobert's process from the seeds of *Agrostemma githago*. It was separated from agrostemma-sapotoxin by precipitation with basic lead acetate. The crude saponin of the seeds contains from 6 to 7 per cent. of the new acid. It is as poisonous as agrostemma-sapotoxin, but does not act so rapidly. When fused with caustic potash, it forms the same acid of high molecular weight as is obtained, under similar conditions, from agrostemma-sapogenin. Pigs and calves react readily to the sapotoxin. If healthy, they appear to acquire a certain immunity to it, but if unhealthy, they are very susceptible to its poisonous properties. Consequently, corn products employed for feeding these animals, when known to be contaminated with corn-cockle seeds, should be used with the greatest care and the stock circumspectly watched for any sign of digestive trouble. When the animals are not well, a small dose of agrostemma-sapotoxin may have a rapidly fatal action. (See also *Y.B.*, **1909,** 5.)

Aloinose identical with Dextro-Arabinose. E. Léger. (*J. Pharm. Chim.*, 1910, **2,** 145.) The sugar aloinose, obtained together with aloe-emodin by the hydrolysis of barbaloin, is found to be identical with dextro-arabinose. The hydrolysis of the glucoside is represented by the equation—

$$C_{20}H_{18}O_9 + H_2O = C_{15}H_{10}O_5 + C_5H_{10}O_5.$$

(See also *Y.B.*, **1905,** 20.)

Arbutin in Pear Leaves. E. Bourquelot and A. Fichtenholz. (*J. Pharm. Chim.*, 1910, **2,** 97; and **3,** 5.) By the biological method the presence of a glucoside was demonstrated in the leaves of the "Louise-bonne" pear in May. This proved to be true arbutin, $C_6H_4\begin{matrix}OC_6H_{11}O_5\\OH\end{matrix}$, a glucoside which

has not previously been found pure, unaccompanied by methylarbutin (*Y.B.*, **1910**, 105). Subsequently the same glucoside was found in two other pears, "Madeleine" and "Carisi." It forms prismatic needles, commencing to melt at 142°C., again solidifying and commencing to re-melt at 191–192°C., and becoming quite liquid at 193°C. When dried in the air it has the α_D −59°80′ to 60°38′; and when dried at 110°C. α_D −63°84′ to −63°75′. Its aqueous solution gives a blue colour with Fe_2Cl_6. The leaves of the quince, *Cydonia vulgaris*, do not contain any arbutin, but a cyanogenetic glucoside, probably prulaurasin. In the subsequent paper, it is noted that in autumn the leaves of those varieties of pears which contain pure arbutin become black when about to fall. Some kinds, such as "Beurre Diel" or "Beurre manifique," turn golden yellow. This is due to the presence of another glucoside besides arbutin; probably this will prove to be methyl arbutin.

Arbutin, Pure. H. Hérissey. (*J. Pharm. Chim.*, 1910, **2**, 249.) A method is given for the preparation of pure arbutin from the commercial product, which is a mixture of arbutin and methylarbutin.

Aucubin, Presence of, in Several Species of Garrya. H. Hérissey and C. Lebas. (*J. Pharm. Chim.*, 1910, **2**, 490.) *Garrya elliptica*, *G. macrophylla*, and *G. thureti* leaves and young twigs are found to yield aucubin. (See also *Y.B.*, **1904**, 36; **1908**, 26; **1910**, 106.)

Camellia japonica Seeds, Glucoside in. R. Ketamura. (*Yakuga Kuzasshi*, Oct., **1910**, 5; *Pharm. J.*, 1911 [4], **32**, 297.) The fat-free seeds when extracted with boiling EtOH yield a glucoside, camellin, $C_{18}H_{32}O_7$, forming crystals which melt at 181–184°C. On hydrolysis it gives a rhamnose and a syrupy substance. No caffeine is present.

Digitalis, Distribution of Digitoxin in. A. Barenstein. (*Pharm. Zeit.*, 1911, **56**, 128.) When assayed by the Keller-Fromme method, the radical leaves yield from 0·527 to 0·531 per cent. of crude digitoxin; the flowers, from 0·563 to 0·585 per cent.; and the seeds from 0·215 to 0·229 per cent. (See also *Y.B.*, **1904**, 541; **1906**, 97; **1907**, 195; **1908**, 67, and *Gen. Index.*)

Digitalis Glucosides. F. Kraft. (*Schweiz. Woch. Chem. Pharm.*, 1911, **49**, 161, 173.) *Digitalein.*—Although this name was given by Schneideberg to water-soluble active glucoside of foxglove, it has not yet been isolated as a chemically pure body. In fact, it may be regarded as a generic term for several such substances. To this may be referred Cloettas *digalen*, the method of preparation for which is unknown and its literature scanty. The author has obtained a pure water-soluble glucoside which he has named *Gitalin*, to distinguish it from other "digitaleins." *Gitalin* is isolated by purifying the cold-water extract of digitalis leaves with lead acetate. After removing excess of this salt, the glucoside is removed by means of $CHCl_3$. The $CHCl_3$ is shaken with anhydrous Na_2CO_3 and $NaSO_4$ to remove "digitalic acid" and water, then poured into petroleum ether. The precipitated glucoside is collected, dried and purified by rapid crystallization from dilute alcohol. It is further purified by re-solution in $CHCl_3$ and reprecipitation with petroleum ether. In this condition it is a white neutral amorphous powder; permanent in the air; m.p. 150–155°C.; soluble 1 : 600 of cold water and in all proportions in $CHCl_3$. In presence of water it is decomposed, forming a water-insoluble compound, which is also formed when the aqueous solutions are boiled. If the amorphous glucoside be dissolved at the ordinary temperature in 1·5 parts of EtOH and the solution be shaken with 0·75 parts of water, the whole solution in a few minutes, forms a crystalline mass of *gitalinhydrate*. When this is dried in the air it loses about 10 per cent. It melts at 75°C. in a capillary tube. It is less soluble in water, 1 : 3,000, than gitalin. Gitalin is not hydrolysed by boiling with alcohol or with water, with formation of sugar, as Kiliani has found commercial digitoxin to be. The yield is about 0·07 per cent. Its aqueous solutions froth strongly on being shaken. A dilution of 1 : 2,500 gives a marked precipitate with tannin. On merely heating the aqueous solution alone, however, a precipitate will be obtained. Both gitalin and anhydrogitalin give a violet colour with Kiliani's reagent, H_2SO_4 containing Fe_2O_3. When an alcoholic solution of gitalin is evaporated to dryness *in vacuo* and the residue is treated with $CHCl_3$, it is only partially soluble. The same takes place with acetone solutions; or when such solutions are allowed to stand for a few hours an insoluble gelatinous precipitate separates. This is collected, freed from unaltered gitalin, and purified by recrystallization from EtOH. It is further purified

by recrystallization from hot dilute alcohol. On cooling *anhydrogitalin* separates out, in fine, hone-shaped needles; sometimes these are only half formed; m.p. 255°C.; insoluble in water and almost so in $CHCl_3$ and other solvents. Anhydrogitalin is hydrolysed by boiling with alcoholic HCl. *Anhydrogitaligenin* is thus obtained in flat plates; m.p. 119°C.; and two sugars, one of these was Kiliani's crystalline digitoxose, the other is amorphous. The aqueous extract of digitalis contains no digitoxin, and the greater part of Keller's "digitoxin" is stated not to be that glucoside. The author has also prepared *digitonin*. After removing digitoxin from the dilute alcoholic extract of the leaves by shaking out with $CHCl_3$, then purifying with animal charcoal, and crystallizing from alcohol, a glucoside forming fine felted or aggregated needles, melting with charring at 265°C., was obtained. Insoluble in water, in C_6H_6, and other solvents, but soluble 1 : 120 in hot alcohol and 1 : 25 in dilute alcohol. It dissolves to a colourless solution in H_2SO_4 containing Fe_2O_3. The m.p. of this is higher than that given generally for digitonin. Its solubilities are also different from that of Schniedeberg.

Eremostachys laciniata, Glucoside of. J. Khouri. (*J. Pharm. Chim.*, 1910, **2**, 211.) The sugar produced by the hydrolysis of the glucoside in this plant (*Y.B.*, **1910**, 110) is now identified as stachyose.

Gentian Root, Variation of Composition of, during the Year. M. Bridel. (*J. Pharm. Chim.*, 1911, **3**, 294.) The amount of gentiopicrin in gentian root never falls below 2 per cent., and it varies in quantity at different periods, less than the carbohydrates. The amount of these which are hydrolyzed by invertin is lowest in the early spring, when 1·213 per cent. was found; and highest in the autumn, with 7·826 per cent. Gentianose is present to the extent of 3 to 5 per cent. except in May and June, when gentiobiose occurs. The roots contain most gentianose in August and September. Saccharose gradually accumulates, reaching its maximum during the autumn. It diminishes as the gentianose does, as soon as growth starts in the early spring.

Gentiana pneumonanthe, Presence of Gentiopicrin in. E. Bourquelot and M. Bridel. (*J. Pharm. Chim.*) This small blue gentian, growing in swamps, is found by the biological method to contain gentiopicrin in the root and leafy stems; the former are richer in the glucoside than the latter.

Glucosidal Constituents shown by the Biological Method in Common Popular Medicinal Herbs. E. Bourquelot. (*J. Pharm. Chim.*, 1910, **2**, 241.) Reviewing the many glucosides which have been discovered by means of his biological method, it is pointed out that indications of the presence of glucosides have been obtained in many others, but these have not yet been isolated. Many of these are common plants which have a wide reputation in popular medicine, but concerning the value of which a certain amount of scepticism has prevailed on account of the apparent absence of "active principles." Such are *Euphrasia officinalis*, the popular "eye-bright" (the French name, "casse-lunettes" indicates its popular esteem) and *Galium aparine* (*Succus galii* still lingers in English pharmacy). Both these contain glucosides. So do members of the N.O. *Ranunculaceæ Labiatæ*, and *Oleaceæ*. It is only a matter of time before these are definitely isolated. It is probable that in many instances their popular estimation of these simple drugs may be justified.

Gynocardin and Gynocardase. C. W. Moore and F. Tutin. (*Proc. Chem. Soc.*, 1910, **26**, 182.) Gynocardinic acid, when methylated by means of dry silver oxide and methyl iodide, yields methyl pentamethylgynocardinate, $C_{12}H_{14}O_4(OMe)_5 \cdot CO_2Me$, which is a liquid boiling at 220°/15 mm. No definite products could be obtained by the hydrolysis of this methyl derivative.

Gynocardin possesses feebly acidic properties, and yields compounds with the alkali metals: the sodium derivative has the formula, $C_{13}H_{18}O_9NNa$.

The action of emulsin and of gynocardase on gynocardin, amygdalin, *l*-mandelonitrile glucoside, and salicin has been quantitatively determined. (See also *Y.B.*, **1904**, 99; **1906**, 40.)

Honey, Bibliography of, from 1892 to 1910. A. H. Bryan (*U.S. Depart. Agric. Bull.*, No. 110), and F. Mutlelet (*Mon. Sci.*, 1911, **74**, 152; *J.S.C.I.*, 1911, **30**, 702.) A useful list of references to the recent papers published on analysis of honey.

Honey, Digestive Enzyme in. W. Lenz. (*Apoth. Zeit.*, 1910, **25**, 678.) When some herrings were pickled in honey vinegar, made from metheglin which had undergone acetous fermentation, it was found that the flesh was nearly all dissolved away. This induced the author to investigate the matter and enabled him to demonstrate that honey vinegar contains a very active diges-

tive enzyme. It attacks and disintegrates hard boiled egg albumin, but, like pepsin, only in acid solution. It is not identical with pepsin, since no peptone is produced by the digestive action, only albumoses.

Honey, Genuine, Overheated, Reaction of, with Fiehe's Reagent. H. Quantin. (*Annales Chim. Analyt.*, 1910, **15,** 290.) Cold run or centrifugalized honey gives no reaction with Fiehe's test (*Y.B.*, **1908,** 93). But if it be melted over a naked fire to a temperature over 100°C. as is often done in preparing it for market, furfural is formed, which will cause the honey to give a reaction as though adulterated with glucose.

Honey, Natural and Artificial. R. Lund. (*Mitt. Lebensm. und Hygiene*, 1911, **1,** 38; *Chem. Zentralb.*, 1911, **1,** 1158. The total nitrogenous matter of natural honey is, as found by Braeutigam and others, much higher than that of artificial honey, ranging from 0·43 to 0·31 per cent. in the former and from 0·2 to 0·1 in the latter. In natural honey, about half of this is in the form of albuminoids, precipitated by tannin, the other half being present as amide nitrogen. A useful test for albuminoids is with a reagent of phosphomolybdic acid, 2 Gm.; dissolved in H_2SO_4 1 : 4, 20 Gm., and water, 80 Gm. Of this 5 c.c. is added to 20 c.c. of a 10 per cent. filtered solution of the honey, and the mixture is made up to 40 c.c. with water. If this be done in a Barth's tube as previously described (*Y.B.*, **1910,** 111), the volume of the precipitate from natural honey will be from 0·60 to 2·7 c.c. in 24 hours, whereas with artificial honey the amount will be at the most 0·5 c.c.

Honey, Value of Tests for. F. Reinhardt. (*Zeits. Untersuch. Nahr. Genussm.*, 1910, **20,** 113; *Analyst*, 1910, **35,** 434.) Fiehe's test (*Y.B.*, **1908,** 93) is quite reliable, and a sample of honey giving a colour with this certainly contains invert sugar. It is better to use 25 per cent. HCl to dissolve the resorcinol, than stronger acid, for the colour is then more permanent. Jaegerschmid's test (*Y.B.*, **1910,** 111), is also satisfactory, but care must be taken to employ chemically pure acetone and pure HCl, sp. gr. 1·19. The volume of the tannin precipitate obtained by Lund's test (*Y.B.*, **1910,** 111) is of little value in detecting adulterants, but if this volume is less than 0·3 c.c. the honey is probably impure. The determination

of the total N is of very little value; since this varies so greatly in genuine honey. Ley's test is untrustworthy, often failing to detect 50 per cent. of added glucose. (See also *Gen. Index.*)

Inulin, Microchemical Detection of. O. Tunmann. (*Berichte Pharm.*, 1910, 577.) Solutions of pyrogallol, 1; or resorcinol, 1; in EtOH, 50; and strong HCl, 50, afford useful reagents for the detection of inulin in vegetable sections. The first gives a violet red colour on gentle warming, and the second a cinnabar red, in the presence of that carbohydrate. The preparations should be macerated first for 8 days in tartaric acid alcohol to remove alkaloids, then further macerated for 8 to 10 weeks in alcohol to harden the inulin, and finally washed with water. These weak solutions of pyrogallol and resorcinol do not react with starch and other cell contents at a gentle heat.

Malt Extract, Determination of the Diastasic of. E. F. Harrison (*Pharm. J.*, 1910 [4], **31,** 121, 290, 333); A. R. Ling (*ibid.*, 267, 312). Harrison's first paper is a reply, with experimental data to confirm his statements, to an adverse criticism on his process (*Y.B.*, **1906,** 278) published by Ling. The subsequent publications are controversial letters, published on both sides, on the question.

Menyanthes Trifoliata, Crystalline Glucoside in. M. Bridel. (*J. Pharm. Chim.*, 1910, **2,** 165; **3,** 607.) From the fresh flowering herb, by the biological method of Bourquelot, a new crystalline glucoside has been isolated. It has been named *meliatin*, and crystallizes from alcohol in anhydrous crystals, m.p. 217°C. (222°C. corr.) in a capillary tube, and at 223° on Maquenne's block; a_D −81°94′; hydrolysed by emulsin; besides reducing sugar, a substance which in aqueous solution gradually acquires a bluish-green colour is formed by this hydrolysis. Meliatin before hydrolysis does not reduce Fehling's reagent. It has the formula $C_{15}H_{22}O_6$. The sugar formed by hydrolysis is glucose. This glucoside is quite distinct from Kromayer's menyanthin.

Pæonia moutan Root, Glucoside in. G. Péron. (*J. Pharm. Chim.*, 1911, **3,** 238–241.) Pæonol does not exist as such in the root of *Pæonia moutan*, but is present in the form of a glucoside which yields pæonol and dextrose on hydrolysis. The hydrolysis is effected by a specific enzyme which is contained in the root and in that of *P. officinalis*, and is also brought

about also by dilute mineral acids, but not by invertase or by emulsin.

Plants containing Coumarin and Glucosides, Action of Ultra-Violet Rays on. — Pougnet. (*Comptes rend.*, 1910, **151**, 566.) Heckel has already shown that anæsthetics and freezing cause coumarin-yielding plants to give off the odour of that substance. Pougnet finds that ultra-violet rays have a similar effect. These rays, derived from a quartz mercury lamp, rapidly cause the development of the characteristic odour of coumarin from *Melilotus* and *Asperula*, less rapidly from *Anthoxanthum odoratum* and slowly from *Herniaria glabra*. Similarly, cress, horseradish, and cherry-laurel give off the characteristic odour of glucosidal decomposition-products when subjected to these rays. In this respect the ultra-violet rays behave in a similar manner to anæsthetics or other mortal agents. They kill the cell, but not the ferments which it contains. Hydrolysis of the glucosides therefore proceeds subsequent to the death of the cell.

Pyrola rotundifolia, Presence of Arbutin in. A. Fichtenholz. (*J. Pharm. Chim.*, 1910, **2**, 193.) The fresh plant treated with boiling alcohol by the biochemical method of Bourquelot, is found to contain about 1 per cent. arbutin, accompanied by traces only of another glucoside, probably methyl-arbutin. It also contains sucrose and the ferments invertin and emulsin. These two ferments are present in so small quantity that the arbutin present undergoes no appreciable hydrolysis on drying; almost as much being present in the dry material as in the fresh plant.

Rutin, Identity of, with Osyritrin, Myrticolorin, and Violaquercitrin. A. G. Perkin. (*Proc. Chem. Soc.*, 1910, **26**, 213.) It has been shown that osyritrin, myrticolorin, and violaquercitrin are identical. Schmidt and Wunderlich have found that when hydrolysed violaquercitrin gives rhamnose in addition to quercetin and dextrose, and that this glucoside is identical with rutin, which yields the same products. The identity of all the above glucosides with rutin is established.

Saponins, Their Properties, Composition and Uses. A. Kobert. (*Pharm. J.*, 1911 [4], **32**, 244, 293.) A monograph on these complex glucosides, on which the author is the leading authority.

Sesbania grandiflora Flowers, Presence of Sugar in. W. G. Boorsma. (*Zeits. Teysmannia*, 1910 [10]; *Apoth. Zeit.*, 1911, **26**, 15.) The leguminous shrub is widely cultivated in Java. It occurs in two varieties with red and white flowers, the latter being preferred. The fresh flowers have a sweet taste, and contain from 3 to 5 per cent. of sugar, apparently chiefly invert sugar, with some cane sugar. They also contain 90 per cent. of moisture. The leaves and young shoots, which are very rich in albuminoids, are used as fodder. The leaves are also used for washing purposes, and contain a saponin, which appears to have no, or very slight, toxic action.

Sophorin, Rhamninose from. H. ter Meulen. (*Chem. Zentr.*, 1911, **1**, 496.) The glucoside sophorin (*Y.B.*, **1905**, 156) when hydrolysed with Tanret's ferment rhamnase, obtained from the berries of *Rhamnus infectoria*, yields the trisaccharide rhamninose, $C_{18}H_{32}O_{14}$.

Stachyose and Lupeose. E. Schulze. (*Berichte*, 1910, **43**, 2230.) Lupeose from the seeds of *Lupinus luteus* and *L. angustifolius* is a tetrasaccharide. Although it furnishes the same hydrolysis products as stachyose, $C_{24}H_{42}O_{21}$, the author considers it to be distinct from that sugar. Tanret has identified stachyose with the tetrasaccharide of manna.

Strophanthus Seeds, Assay of, by Chemical Means, and Preparation of Tincture of Strophanthus. T. Haycock. (*Pharm. J.*, 1911 [4], **32**, 553.) The powdered seeds are percolated with petroleum ether, or with Et_2O to remove fat. The marc is dried from the volatile solvent, then extracted by percolation with alcohol 70 per cent. The strong tincture thus obtained is evaporated at a low temperature, and the soft extract left is dissolved in about 100 c.c. of water and filtered into a separator. Two c.c. of 25 per cent. H_2SO_4 is added, and the acid liquid is then shaken out three times with Et_2O. (The ethereal extracts are rejected.) The aqueous acid liquid is then heated for 1 hour on the water-bath at 75°C., when the strophanthin will be hydrolysed into strophanthidin and strophanthobiose methyl ether. After cooling, the mixture is shaken out with 10, 10, and 10 c.c. of $CHCl_3$. The bulked $CHCl_3$ extracts are evaporated to a low bulk in a tared capsule, a little EtOH is added, and the yellowish white crystalline residue when dried at 65°C., is weighed. The result divided by 0·365 gives the

equivalent of strophanthin present. The strophanthidin thus obtained gives an orange red colour with cold H_2SO_4, changing on standing to emerald green. Seeds responding to the official requirements gave from 2·85 to 4·57 per cent. of strophanthin by this method.

Suggestions for a New B.P. Tincture of Strophanthus.—The powdered seeds should be percolated first with ether to remove the oil and irritating resin, then dried and percolated with 70 per cent. alcohol until exhausted. The amount of strophanthin present being determined by above process and a standard of 0·1 per cent. w/v strophanthin should be adopted. The chemical method of standardization is quite as good, if not better, than the present method of physiological assay, the standard there being taken: "$\frac{1}{4}$ min. of tincture should be sufficient to arrest the heart of a frog weighing 20 Gm. in systole in about 1 hour," this method being open to the objection that one is not absolutely sure of a normal condition of the frog when the tincture is injected. It has not been definitely proved that strophanthus acts the same on the frog as on a human being.

Tephrosia purpurea, Glucoside from. G. Clarke, jun., and S. C. Banerjee. (*Proc. Chem. Soc.*, 1910, **26,** 213.) Further investigation of the yellow glucoside previously reported on (*Y.B.*, **1909,** 90) shows that it has the formula $C_{27}H_{30}O_{16}\cdot 3H_2O$. When hydrolysed, it is decomposed into quercetin, dextrose, and rhamnose, according to the equation, $C_{27}H_{30}O_{16} + 3H_2O = C_{15}H_{10}O_7 + C_6H_{12}O_6 + C_6H_{12}O_5\cdot H_2O$. It is identical with rutin, which therefore has the above formula, and not that hitherto ascribed to it. (See also *Y.B.*, **1907,** 159; **1910,** 173; and *Gen. Index.*)

Trevesia sundaica, Saponin in. J. Flieringa. (*Archiv. pharm.*, 1911, **249,** 161.) The alcoholic extract of the leaves of *Trevesia sundaica* contain a saponin which may be salted out from aqueous solution by means of Am_2SO_4. When purified by precipitation with Et_2O from EtOH solution, and hydrolysed, it gives a sapogenin, and several sugars, hexoses, and pentoses, including methyl pentose.

Verbascose, a New Sugar from Verbascum thapsus Roots. E. Bourquelot and M. Bridel. (*Comptes rend.*, 1910, **151,** 760.) The biological method has shown the presence of a

new sugar, verbascose, in the roots of *Verbascum thapsus*. It has been isolated in sphero-crystals, composed of aggregated needles. M.p. 219–220°C.; a_D + 169·9°. It is probably an isomer of stachyose, from which it differs in having a higher m.p. and a_D. On hydrolysis it gives lævulose, glucose and galactose. The roots of the first year's mullein plants contain more verbascose than those of the second year's growth. The roots also contain a glucoside, which is more plentiful in the second year.

Verbascose, Nature of. E. Bourquelot and M. Bridel. (*J. Pharm. Chim.*, 1911, **3**, 569.) Since verbascose is hydrolysed so much more slowly by invertin than stachyose, the inference is drawn that the two sugars are not isomeric, although the hexoses formed by hydrolysis are identical, lævulose, glucose and galactoses. Probably verbascose has a higher molecular weight. The same difference is known to exist between stachyose and raffinose, where the time of hydrolysis also differs.

GUMS, OLEO-RESINS AND RESINS

Asafetida. (*Evans' Analyt. Report Notes*, **1910,** 11.) Only one sample out of 13 examined answered the ash requirement of the B.P. This gave 5·7 per cent. of ash and 60 per cent. of resin, in small whitish tears. A much more frequent ash content in otherwise good samples was from 16·3 to 44 per cent., with from 23 to 37·5 per cent. of alcohol-soluble resin. One sample, with no similarity to asafetida beyond a faint odour, left an ash of 15·1 per cent., and contained 23 per cent. of a resin and did not answer the umbelliferone test. Some samples contained as much as 69 per cent. of large stones. (See also *Y.B.*, **1906,** 31; **1908,** 24; **1909,** 13; **1910,** 120, 419.)

Benzoin, Palembang. (*Southall's Report*, **19,** 6.) A specimen of this was found to be inferior to an average sample of the Sumatra drug, and to contain much insoluble matter. Soluble in 90 per cent. alcohol, 81·73 per cent.; insoluble in 90 per cent. alcohol, 16·77 per cent.; free balsamic acids, calculated as benzoic acid, 6·64 per cent.; combined balsamic acids, calculated as benzoic acid, 10·98 per cent. (See also *Y.B.*, **1907,** 24; **1908,** 31; **1910,** 120.)

Cabure Balsam. A. Tschirch and J. O. Werdmueller. (*Archiv. Pharm.*, 1910, **248,** 431.) The small amount of material

available was contained in a gourd. The ethereal solution yielded benzoic acid, and the benzoate of a resinotannol when shaken out with 1 per cent. Na_2CO_3 solution. The cabureba resinotannol. $C_{14}H_{18}O_4$, was liberated by saponifying this. It gives an olive green colour with alcoholic Fe_2Cl_6, and finally a dark brown precipitate; with K_2CrO, an orange colour, and with $Pb2C_2H_3O_2$ a light brown precipitate. Vanillin was also present. It contains no cinnamein.

Copaiba, African, Detection of. T. T. Cocking. (*Chem. and Drugg.*, 1910, **77**, 119.) To detect adulteration of copaiba with the African oleo-resin, the sample is submitted to distillation either by steam, or *in vacuo*, and the volatile oil so obtained is dried, then fractionally distilled to dryness *in vacuo*. Ten equal fractions are collected, and the a_D of each of these determined in a 100 mm. tube.

If the sample be pure the figures obtained will all be negative, and they will increase arithmetically from the first to the last fraction (that is, each successive fraction is more strongly lævo-rotatory than the preceding one), although not regularly. If, now, the rotation of the first fraction be subtracted from that of the tenth, a figure will be obtained which varies very little for genuine samples, and is always a negative quantity. This figure, the "difference value," will only vary $-3{\cdot}7°$ to $-7{\cdot}6°$.

When African copaiba is examined in this manner, the rotations of all the fractions are dextrogyrate, and the rotations of the successive fractions increase, but to a much greater extent than with the South American copaiba, in consequence of which the difference value is much greater than copaiba and is a positive figure. The figures also show a curious feature in that the tenth fraction has a considerably lower rotation than the ninth. As would be expected from the fact that the range of boiling points of the constituents of the volatile oils from the two varieties are practically identical, a mixture of the two will distil over containing proportional parts in each fraction, and the presence of African balsam will be shown at once by the difference value being positive. In some cases where only a small percentage of the adulterant is present, all the fractions will be lævogyrate but the difference value will be positive. When the same process is applied to gurjun oil, like copaiba, it gives lævogyrate fractions, but, unlike it, they successively decrease instead of

increasing, and thus give a positive difference value, similar to African copaiba.

With the true copaibas the rotation of the first fraction is in every case lower than that of the original oil, but in the adulterated samples it is higher. It is important that the distillation of the oil should be conducted *in vacuo*, since, if carried on under ordinary pressure, the higher temperature necessary causes some decomposition, which entirely alters the optical rotation. A table of a series of fractionations illustrates the communication.

Accra Copal. A. Tschirch and M. Kahan. (*Arch. Pharm.*, 1910, **248,** 443.) The copal was treated by Tschirch's systematic scheme for the examination of resinous secretions. It is soluble in Et_2O 1 : 2 ; in EtOH 54 : 100 ; in pyridine 87 : 100 ; entirely soluble in a mixture of EtOH and Et_2O. Acid value, 121·8 ; iodine value, 58·54 ; m.p. between 106° and 156°C. The following acids were isolated from the ether solution : Accracopalic acid, $C_{21}H_{34}O_3$, m.p. 104–106°C. ; *a*-accracopalolic acid, $C_{18}H_{30}O_2$, m.p. 152–155°C. ; *β*-accracopalolic acid, $C_{19}H_{32}O_2$, m.p. 144–148°C. ; *a*-accracopalenic acid, $C_{10}H_{20}O_2$, m.p. 142–146°C. ; *β*-accracopalenic acid, $C_{12}H_{20}O_3$, m.p. 150–152°C. ; *a*-accracopal resene, $C_{15}H_{36}O_6$, m.p. 178–180°C. ; and an essential oil. The portion of the oil insoluble in ether contained accracopalinic acid, $C_{14}H_{26}O_3$, m.p. 122–124°C., *γ*-accracopal resene, $C_{10}H_{20}O_3$, m.p. 184–186°C. ; and *β*-accracopal resene, $C_{13}H_{26}O_3$, m.p. 197–199°C.

Copal, Benin. M. Kahan. (*Archiv. Pharm.*, 1910, **248,** 433.) This copal resembles copaiba copal. The percentages soluble in solvents are approximately : in EtOH, 6 ; in Et_2O, 45·5 ; in acetone, 35 ; in C_6H_6, 32 ; in $CHCl_3$, 33 ; in acetic acid, 41 ; in acetic ether, 44 ; in petroleum ether, 11. Freely soluble in alcohol ether. It sinters at 120°C., and is fully melted at 166°C. ; acid value, 101·15 ; saponification value, hot, after 1 hour, 149·8 ; iodine value, 61·02. The ether-soluble portion yielded to Am_2CO_3 solution about 9 per cent. of crude acid, which when precipitated with $Pb_2C_2H_3O_2$ gave benincopalic acid, $C_{17}H_{32}O_4$, a white powder, m.p. 137°C. On treating copal with Na_2CO_3 solution, about 25 per cent. of crude acids were removed, from which two were separated by the varying solubility of their lead salts in acetic acid : *a*-benincopalolic acid, $C_{13}H_{32}O_6$, m.p. 81°C_6., soluble

in acetic acid ; and β-benincopalolic acid, $C_{20}H_{30}O_2$, a pale yellow powder, m.p. 119°C., insoluble in that acid. Aqueous KOH solution then removed about 6 per cent. of crude acids, from which benincopalenic acid, $C_{27}H_{48}O_2$, m.p. 101°C., was separated as an insoluble lead salt. The residual copal, after extraction as above, gave, on steam distillation, about 3 per cent. of colourless essential oil, boiling between 180–256°C. The distillation residue contained 6 per cent. of α-benincopaloresene. The portion insoluble in ether, but soluble in ether-alcohol, gave about 47 per cent. of crude acids partially soluble in boiling EtOH. The portion dissolved in this solvent was further separable by means of alcoholic lead acetate solution into α-benincopalinic acid, $C_{21}H_{30}O_3$, m.p. 187°C., with an insoluble lead salt ; and β-benincopalinic acid, $C_{15}H_{28}O_3$, m.p. 193° to 197°C., with a soluble lead salt. The portion of the KOH soluble matter which is insoluble in boiling EtOH is γ-benincopaloresene, $C_{13}H_{26}O_4$, a white powder, m.p. 192–195°C. The portion insoluble in KOH is β-benincopaloresene, $C_{12}H_{30}O_{10}$. (For other copals see *Y.B.*, **1904,** 202 ; **1907,** 50 ; **1908,** 60, 61 ; **1909,** 28 ; **1910,** 124.)

Copal, Detection of, in Amber. F. Klein. (*J. Ind. Eng. Chem.*, 1910, **2,** 389.) A little of the finely powdered sample is added to about 4 c.c. of acetic ether containing 0·5 Gm. of $Co2NO_3$; then 2 c.c. of glacial acetic acid and 1–2 c.c. of $CHCl_3$ are successively added, and the mixture heated. Copal dissolves ; but amber becomes granular. On adding the solution to strong MeOH, a silky precipitate is obtained if copal be present, otherwise the solution will remain clear. Small quantities of copal can be detected by the opalescence produced on adding water to the MeOH solution.

Copal, Manila. G. F. Richmond. (*Chem. Rev. Fett. Harz.*, **1911,** 10 ; *Pharm. Zentralh.*, 1911, **52,** 128.) The resin exported from the Philippines under the name of Manila copal is derived from *Agathis alba*. The greater part is obtained by the natives from the living tree ; a little is found in lumps at the roots. A specimen examined had the following characters : Acid value, 128·1 ; saponification value, 177·8 ; it contains a free amorphous acid ; a volatile hydrocarbon ; a neutral saponifiable substance probably a lactone ; and an unsaponifiable resin. Dilute aqueous alkali dissolves 80 per cent. of the crude resin. Three monobasic resin-acids were separated : One, crystalline, m.p. 185–187°C., $C_{10}H_{15}O_2$; the second, amorphous, $C_{22}H_{34}O_4$;

the third, not quite pure, $C_{32}H_{50}O_2$. The copal loses from 13·3 to 17·4 per cent. on heating to 250–325°C., without showing any marked decomposition. (See also *Y.B.*, **1906,** 28; **1908,** 61.)

Gums from Northern Nigeria. (*Bull. Imp. Inst.*, 1910, **8,** 352.) Large gum-yielding areas occur in Northern Nigeria; details of the botanical sources and methods of collecting the gum are given by Dr. J. M. Dalziel. Information has also been obtained from the Resident in the Bornu Province. A number of specimens of these gums have been examined at the Imperial Institute. Although the botanical origin of some of the less important gums examined has not been established, it has been shown that in Bornu and Yola the principal sources of gum, viz. *Acacia senegal*, *A. seyal*, and *A. sieberiana*, are the same species that yield the important commercial gums of the Anglo-Egyptian Sudan and of Senegal. Moreover, in the chief gum-collecting centres, the same species of *Acacia* often occurs alone over wide areas, so that it is not impossible in Bornu, at least, to ensure that the gum collected may be almost entirely from a single species, thus ensuring uniformity in the commercial article. The importance of this is obvious and is shown in the table, which summarizes the results already obtained and shows the variation in properties exhibited by gums from different species.

Source of Gum.	Moisture per cent.	Ash per cent.	Matter insoluble in Water per cent.	Strength as measured by Viscosity.	Colour of Mucilage.
Bornu Province—					
Acacia senegal	10·24 to 11·48	2·87 to 3·17	1·20 to 1·94	5·36 to 6·66	Almost colourless to pale brown.
Acacia seyal .	11·19 to 11·42	2·50 to 2·66	0·84 to 1·41	5·86 to 6·66	Brown.
Yola Province—					
Acacia suma .	13·32 to 13·56	2·00 to 2·36	4·10 to 4·50	14·1 to 16·7	Colourless to brown
Acacia sieberiana . .	13·63	2·65	0·76	13·3	Pale coloured.
Sokoto Province—					
Combretum sp.	12·9	2·0	1·2	7·8	Dark brown.

Honduras Balsam, Pale and Dark. A. Tschirch and J. O. Werdmueller. (*Archiv. Pharm.*, 1910, **248,** 420.) *Pale Balsam.*—The three samples examined had the sp. gr. from 1·0884 to 1·0905. The mean acid value was 32·67; saponification value, 173·2; equivalent to 8·6 per cent. of free, and 45·6 per cent. of total cinnamic acid. The solution of the balsam in Et_2O was shaken out with Na_2CO_3 solution, 1 : 100, which separated cinnamic acid and a resinolresin: the latter on saponification

gave the same acid, and honduroresinol, $(C_{16}H_{26}O_2)_n$ melting at 166–167°C., insoluble in KOH. It was accompanied by a body, $(C_{22}H_{34}O_4)_n$, soluble in KOH solution, melting at 160°C.$_n$, and giving phytosterol reactions. The ethereal solution, after extraction with Na_2CO_3, was shaken out with 1 per cent. KOH solution; the same products as above were removed with a phytosterol-like substance, $(C_{20}H_{32}O_5)_n$. During the extraction, a white flocculent precipitate formed; this was separated and treated with boiling 1 : 100 alcoholic solution of KOH; *β*-honduroresene, $(C_{38}H_{38}O_4)_n$, was left insoluble; m.p. above 300°C.$_n$, and is insoluble in most solvents. A portion of the balsamic residue after extraction with the above alkalies, the so-called "cinnamein," was fractionated *in vacuo*. On saponifying these fractions a small amount of a crystalline substance, in needles, m.p. 58°C., the hydrocarbon hondurane, C_8H_{10}, b.p. 154–155°C., and a little di-styrol were obtained, besides cinnamic acid. Another portion of the "cinnamein" was saponified with boiling 1 per cent. KOH solution and the oil distilled. The non-volatile residue was then fractionated *in vacuo*. In this way besides cinnamic acid, a hydrocarbon C_9H_{12}(?), hondurane, di-styrol, and cinnamic alcohol were obtained.

Dark Balsam.—Sp. gr. 1·0897 to 1·0915; acid value, 29·9; ester value, 153·9. When treated as described above, Na_2CO_3 solution separated cinnamic acid and an isomer of honduroresinol, m.p. 141°C., forming a crystalline Na salt. This also was accompanied by a phytosterol, $(C_{20}H_{30}O_4)_n$, m.p. 163–165°C. Subsequent treatment with 1 : 100 KOH solution besides cinnamic acid and honduroresinal cinnamate, separated another phytosterol substance $(C_{18}H_{26}O_4)_n$. After distilling off the oil from the products of the saponification of the "cinnamein" of this balsam, dissolving the non-volatile residue in alcohol, and cooling the alcoholic solution in CO_2 snow, a crystalline mass was separated. This consisted of a mixture of a resene insoluble in petroleum ether, and an alcohol, hondurol, $C_{17}H_{16}O_2$, crystallizing in nodules of acicular crystals, m.p. 42·5, soluble in warm petroleum ether. The mother liquor from which these crystals separated contained phenylpropyl alcohol and di-styrol. (See also *Y.B.*, **1906**, 40.)

Khaya madagascarensis Gum. A. Gérard. (*Bull. Sci. pharm.*, 1911, **18**, 148.) The gum of this Meliaceous tree occurs in stalactites varying in colour from pale yellow to brown; odourless and tasteless; partially soluble in water; precipitated

by lead acetate and basic acetate. The portion which is insoluble in water swells to make a thick mucilage. The gum contains an oxydase, a peroxydase and an emulsin, a tannin with galactanes and pentosanes. No starch was found.

Lac, Stick and Seed. (*Bull. Imp. Inst.*, 1911, **8**, 371.) The specimens examined were from Baroda and were collected from *Pithecolobium saman*, or "rain tree," which has only recently been used as a host for the lac insect. The stick lac consisted of small branches and twigs covered often incompletely with lac incrustation. The amount of actual resin was 26·8 per cent. This yielded the following results: Moisture, 2·8 per cent.; ash 1·4 per cent.; wax, 9·0 per cent.; colouring matter, 7·2 per cent.; insoluble matter, 8·1 per cent.; resin, 71·5 per cent.; iodine value, 5·6; iodine value, after purification, 4·0. Seed lac gave: Moisture, 2·7 per cent.; ash, 2·2 per cent.; wax, 6·6 per cent.; colouring matter, 12·4 per cent.; insoluble matter, 8·6 per cent.; resin, 67·5 per cent.; iodine number, 4·5 per cent.; iodine number after purification, 3·9 per cent.

Peruvian Balsam. (*Evans' Analyt. Report*, 1910, 56.) This article continues to present difficulties to the analyst, as shown below. No. 1 is the most reliable natural balsam obtainable commercially. No. 2 is a cheaper so-called genuine balsam; whilst No. 3 is an artificial balsam.

No.	Ref. Ind. (approximate).	Sap. Val.	Iod. Val.	Per cent. Cinnamein.	Sap. Val. of Cinnamein.	Dieterich's Test.	Cæsar's Test (Nitric Acid.)	Acid Value.
1	1·590	233 (hot)	42·7	57–60 (thick liquid)	238	Doubtful	Transient violet, turning yellow green	74·2
2	1·586	235 (hot) 239 (cold)	37·5	57–60 (liquid)	233	Doubtful	Doubtful, turns yellow green	61·1
3	1·586	222 (hot)	44	80–85 (semi-solid)	206	Answers, but not decisively	Gives a transient violet colour, turning green, probably due to Gurgun balsam	60·2

Sample 1, although a direct import, consisted substantially of a synthetic mixture. Sample 2 was evidently a mixture of artificial and natural balsams. These conclusions are further confirmed by the fact that a constant colour reaction was observed when strong H_2SO_4 was brought in contact with the evaporated ether extract from the saponified portion. All three samples gave a fine chocolate purple colour, turning violet immediately the mixture was diluted with water. It is quite evident that ordinary analysis will not indicate the extent of adulteration. (See *Y.B.*, **1908,** 157.)

Podophyllum Resin, American, Adulterated. (*Evans' Analyt. Report,* **1910,** 61.) A specimen of American podophyllin was soluble in water to the extent of 51·2 per cent. Only 46 per cent. was dissolved by $CHCl_3$, and 57·2 per cent. in Et_2O. It left 3·2 per cent. of ash. Aloes was probably the adulterant. Podophyllin resin from authentic sources had the following solubilities in cold water, 8·2 to 8·5 per cent.; in hot water, to 21·5 per cent.; in alcohol, at least 98·4 per cent.; in choloroform at least 67·5 per cent.; in ether, at least 80 per cent.

Resins, Colour Reactions of Certain, with Halphen's Reagent for Colophony. E. F. Hicks. (*J. Ind. Eng. Chem.*, 1911, **3,** 86.) Halphen's reagent, which was used by Foerster as a sensitive test for colophony, also gives characteristic colourations with other resins. *Dammar resin* slowly gives a brown to lilac-brown colour, which gradually changes to reddish-brown. *Elemi* gives an immediate permanent indigo blue colour, which slowly darkens and sometimes assumes a purplish hue. *Kauri copal* produces an azure-blue tint, changing rapidly through violet to purple. At the point most distant from the bromine vapour the colour is olive-green. *Manila gum* (spirit-soluble) slowly gives a faint brownish-green, which gradually changes to violet and finally to purple. A chocolate brown colour is usually obtained at the point most remote from the bromine vapour. *Mastic* yields a reddish brown colour, which approaches carmine in the vicinity of the bromine vapour. At the most remote point the colour is coffee-brown. *Sandarac* immediately gives a permanent violet colour, but at the point furthest from the bromine vapour the colour changes to violet and finally to violet brown. *Shellac*, when pure, gives no colourations. *Zanzibar copal* slowly gives a light brown colour, changing to brownish-violet and finally to chocolate-brown with a violet tint. Valu-

able indications are also obtained in the case of mixtures, but when colophony is present, the reaction is so intense as to mask the other colour reactions.

Scammony and Scammony Resin. H. Engelhardt and M. R. Schmidt. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1027.) The results of the author's work are summarized in the following tables :—

TABLE I. CHARACTERS.

Sample.	Moisture.	Ash.	Acid. No.	Sap. No.	Ester No.
I	6·16	2·70	18·5	207·2	188·7
II	1·95	..	10·6	236·6	226·0
III	2·07	0·21	16·3	256·2	239·9
IV	1·45	0·20	10·2	175·8	165·6
V	2·25	0·07	12·2	177·1	164·9
VI	2·23	0·20	14·0	171·6	157·6
VII	4·29	0·30	13·6	183·8	170·2
VIII	2·03	0·15	14·9	175·9	161·0

TABLE II. SOLUBILITIES.

Sample.	Soluble in Abs. Ether.	Soluble in U.S.P. Ether.	Soluble in $CHCl_3$.	Soluble in Alcohol.
I	71·8	85·0	82·1	90·6
II	100·0	100·0	100·0	100·0
III	93·9	96·0	100·0	100·0
IV	89·4	84·1	98·0	100·0
V	90·2	85·5	98·9	100·0
VI	88·3	80·9	96·1	100·0
VII	89·6	82·0	96·9	100·0
VIII	90·4	91·5	97·4	100·0

TABLE III.

Sample.	Iodine No.	Specific Rotation, Degrees.
I	11·69	−25·98
II	10·45	−24·97
III	17·83	−24·24
IV	11·60	−32·78
V	11·48	−33·80
VI	13·93	−34·27
VII	12·46	−31·31
VIII	11·65	−31·83

Sample I was labelled "Virgin scammony, Elect"—and was probably genuine scammony from *Convolvulus scammonia*. No. II was the same, purified by treatment with alcohol. No. III was scammony resin prepared by the authors from scammony root. No. IV was resin obtained by the author from *Ipomœa orizabensis* root. No. V, although labelled "Virgin scammony resin," was apparently incorrectly described. It was purified before analysis. No. VI was also called "True Scammony" resin. Like V, it was misbranded. No. VII was labelled "Scammony resin." It had an odour like pepper, and was found to be derived from Mexican roots. No. VIII was the same purified. The authors confirm the results of Guigues, Cowie, and Thompson as to the value of the saponification value and α_D in determining the source of these resins. They find the Wij's method for determining the iodine absorption to be more convenient than that of Hübl; although the actual figures obtained are of little value for differentiation.

Scammony, Determination of Ether-Soluble Resin in. (*Evans' Analyt. Report*, **1910,** 67.) Four Gm. of powdered partially dried gum resin is digested in a stoppered flask, with 40 c.c. of Et_2O (0·717 to 0·725 preferably), for 1 hour with shaking. Then rapidly filter into a measure, note the volume and evaporate 20 c.c. of the filtrate to dryness on a water-bath, desiccate with a little absolute EtOH, and dry until constant at 100–105°C. The following empirical formula will then give results sufficiently accurate for ordinary commercial work.

V = Number of c.c. of filtrate + 6.

W = Weight of resin in evaporated fraction.

$$\text{Per cent. Resin} = \frac{100\ W \times V}{80}.$$

A sample of so-called 100 per cent. gum scammony was examined, having saponification value, 200; acid value, 9; Wij's value, 11; α_D −22°17′. It was entirely soluble in 0·720 ether. It was therefore not scammony resin entirely, but contained a large admixture of Mexican scammonin.

Scammony, New Fraudulent. P. Guigues. (*Bull. Sci. Pharm.*, 1911, **18,** 327.) A specimen of what purported to be scammony, ambiguously labelled, "Pure Aleppo scammony resin 87 per cent.," was found to be a mixture of 84·02 per cent. of commercial crude resin of scammony and 11·48 per cent. of very finely powdered scammony root.

Scammony Resin, Orizaba Resin, and Jalap Resin, Acid and Saponification Values of. G. Weigel. (*Pharm. Zentralh.*, 1910, **51**, 721.) The author does not agree with the conclusions of Taylor (*Y.B.*, **1909**, 81) that the saponification values of Levantine and Mexican scammony resins form reliable data for their distinction, that of the latter being invariably below 190 and that of the former much higher, 238 to 240. He finds that these figures are by no means so definite as supposed. Although some samples of Orizaba resin have figures approaching to, or below, 190, others have had much higher saponification values. Eight samples of the resin have been examined; the lowest saponification value obtained was 179·71; the highest 228·68. On the other hand Taylor's figures for the saponification value of Levant scammony resin are taken to be much too high. For this, the author supports the data of Kremel, who has found the saponification number 185·6 for the resin extracted from true scammony root, and 180·2 for Aleppo scammony resin. Wiegand agrees, however, that the acid value is an extremely useful criterion for the detection of foreign resins. In both Levantine scammony and Orizaba resin the acid value does not exceed 30; and in true jalap resin 20 is the limit. The saponification value of the last-named resin is found in ten samples to vary from 162·86 to 184·80. As throwing a possible light on the discrepancies found in the figures of different observers, Weigel indicates the method of procedure. He shows that when the saponification liquid is titrated back while hot, the figures obtained are always markedly lower than if this operation is delayed until the liquid has cooled. Thus two jalap resins saponified with N/2 KOH solution for 1 hour and titrated back, while hot, with N/2 HCl, gave the saponification values 162·8 and 184·8; the same resins, similarly treated, but titrated back after cooling, gave the higher values 182·0 and 210·6 respectively. The back titration should always be performed in the hot saponification liquid. (See also *Y.B.*, **1907**, 145, 146; **1908**, 457, 462; **1909**, 81, 123; **1910**, 123, 124.)

Shellac Analysis. W. Vaubel. (*Chem. Zeit.*, 1910, **34**, 991, 1008.) Resin as an adulterant of shellac may be determined quantitatively by extraction with solvents, of which $CHCl_3$, CCl_4, and C_6H_6 are suitable, since resin is readily soluble in these, whereas shellac is almost insoluble. A 1 : 10 hot aqueous solution of borax is an excellent solvent for shellac. Thus 10

Gm. of the sample is heated on the water-bath with 200 c.c. of this solution, with constant agitation. The insoluble residue is collected, washed with borax solution, and weighed. The Br value is preferable to the iodine value as a means of determining resin. The Br value of shellac is about 8; that of resin 120 to 130. This is determined as follows: Five Gm. of the finely powdered shellac is shaken in a closed flask with 100 c.c. of $CHCl_3$ or CCl_4 for 30 minutes: then 30 c.c. of water, 20 c.c. of strong HCl and 10 Gm. of KBr are added; followed by a solution of pure $KBrO_3$ 2 : 100, added 1 c.c. at a time, until a yellow colour appears in the liquid which persists for 30 minutes. (See also *Y.B.*, **1908,** 182.)

Shellac, Lac Resin and Seed Lac, Analytical Characters of Authentic Samples. Puran Singh. (*J.S.C.I.*, 1910, **29,** 1435.) The following data were obtained with pure shellac, free from orpiment and added resin, prepared by the author from three varieties of crude lac, by extraction with wood spirit. The crude lacs, obtained directly from the Forest Department of the Central Provinces, India, were free from foreign admixture and were labelled "Kusumi lac" from *Schleichera trijuga*; "Palas lac," from *Butea frondosa*; and "block lac." For comparison a sample of shellac manufactured in a shellac factory at Mirzapur, free from resin, but containing about 0·3 per cent. of yellow arsenic, was also examined.

The lac wax examined was prepared from dried crude Kusum lac by extraction with petroleum ether, and had a melting-point of 58–59°C. The lac resin was extracted from the same variety of crude lac. It was completely freed from all traces of wax, red dye, and insoluble matter by prolonged treatment of the lac with petroleum ether (lasting for 24–30 hours), washing away the red colour from the residue with hot water, and by repeated precipitation of the alcoholic solution of the wax-free lac with water until the brown amorphous powder obtained was of a perfectly white to yellowish grey colour. It was then thoroughly dried between filter papers and finally in a desiccator over H_2SO_4. A quantity of this anhydrous resin was kept at its melting-point for about a quarter of an hour for the purpose of determining the effects of melting on the resin.

During the drying of the lac resin in an air oven it was found that keeping it at 100–110°C. for 6 hours resulted in the formation of resin acid anhydrides which were insoluble in alcohol.

A determination of the iodine absorption of this dehydrated resin gave the value 10·6.

The acid value was determined by boiling 1 Gm. of the material for 5 minutes under a reflux condenser with 100 c.c. of neutralized 98 per cent. EtOH. and titrating when cold with aqueous N/2 KOH, with phenolphthalein indicator. In the case of lac wax, however, the amount of the EtOH used was 200 c.c., and in order to keep the wax in a melted state the liquid was kept hot during the titration. The saponification value was determined on a separate quantity of the material in each case by boiling 1 Gm. for 15 minutes with 25 c.c. of about N/2 alcoholic KOH under a reflux condenser, then adding to the liquid 100 c.c. of neutralized alcohol, and titrating back the excess of potash with N/2 HCl, with phenolphthalein indicator. The wax, however, was saponified by boiling it with 50 c.c. of the alcoholic KOH over a naked flame for 1½ hour.

The iodine value was determined by dissolving 0·6 to 1 Gm. in 25 c.c. of EtOH and 10 c.c. of $CHCl_3$ (except in the case of lac wax, for which larger quantities of the solvents had to be employed), adding Hübl's solution in a large excess, letting stand for 18 hours in a dark place, and then titrating with N/10 thiosulphate after previously adding to the liquid the necessary amount of a 10 per cent. KI solution and 300–500 c.c. of water.

For the purpose of obtaining comparative results, it is absolutely necessary that the time of treatment with Hübl solution and other conditions of determining the iodine absorption of resins should always be identical. Want of observation of this rule alone renders the iodine value determinations of many observers useless for comparative purposes.

The Endemann number was determined by dehydrating, 1·5 to 2 Gm. of the lac, and 3 to 4 Gm. of sand by heating with strong HCl. It was found, however, that if the lac before adding the HCl be heated for 2 hours to 100–105°C. with precipitated SiO_2, which had been previously calcined for 12 hours at a white heat; the resin is much more easily dehydrated than by Endemann's original method.

Practically all the constants of pure shellac given in the above table agree pretty closely with the average figures for shellac as given by E. J. Parry (*Y.B.*, **1902,** 139), and all the figures ranging between 20 and 30 for the iodine value of shellac previously recorded by various observers were without doubt obtained from adulterated samples. Parry's figure for ester value

150 would, however, appear to be too high an average for good shellac.

While the acid and saponification values of lac wax are very considerably less than those of shellac, the iodine value of the former is about equal to that of ordinary shellac containing 3 to 5 per cent. of wax. The presence of lax wax even in abnormally large proportions will not, therefore, appreciably alter the iodine value of shellac.

The constants of pure lac resin, notably the iodine value, are lower than those generally obtained for shellac. This is explained by the absence of lac wax and other minor ingredients of shellac in the pure resin. When the pure anhydrous resin is melted and kept in the semi-liquid state for about 15 minutes, the iodine value is slightly lowered (from 6·8–7·3 to 5·9), thus showing that the operation of melting shellac tends to increase the proportion of saturated resin acid anhydrides, which are only slightly soluble in alcohol. It is, however, remarkable that when the same resin is dried at 100–110°C. for 6 hours, its iodine value is considerably increased above that of pure unmelted resin, although more than 90 per cent. of such dried resin is insoluble in absolute alcohol. It would thus appear that the proportion of unsaturated compounds among the resin acids and anhydrides of the resin, produced through condensation by prolonged heating, is much greater than in the ordinary lac resin.

The results are thus tabulated :—

	Moisture (at 100°C.).	Matter insoluble in Hot Alcohol.	Acid Number (A).	Saponification Number (B.)	Ester Number (B–A).	Iodine Absorption (Hübl) after 18 hours' action.	Endemann Number.
	Per cent.	Per cent.				Per cent.	
Shellac from Kusum lac	2·7	0·7	61·1	201·0	139·9	9·6	8·4
Shellac from Palas lac .	3·8	0·8	60·8	202·4	141·6	9·3	8·0
Shellac from Block lac .	3·9	1·1	63·1	201·6	138·5	8·2	9·2
Mirzapur Factory Shellac	2·0	0·6	64·4	203·6	139·2	8·6	7·4
Lac wax m.p. 58–59° C.)	—	—	22·1–24·3	79·2–85·0	57·1–60·7	8·8	—
Lac Resin desiccator (dry) . .	—	—	52·1–59·2	193·5–198·4	139·2–141·4	6·8–7·3	7·3–8·1
Lac resin (melted) .	—	—	54·9	190·0	135·1	5·9	—

(See also *Y.B.*, **1908,** 182, and *Gen. Index.*)

Storax, Deterioration in Quality of, in Recent Years. J. C. Umney. (*Perf. Record*, 1911, **2**, 126.) The characters of commercial storax have entirely changed during the past few years, as shown by the following figures :—

Year.	Acid No.	Ester No.	Cinnamic Acid, Free and Combined.
1907	68·9	111·9	19·0
1907	67·1	120·9	15·2
1908	96·4	94·0	14·1
1909	95·9	65·4	11·6
1909	111·6	63·8	11·7
1910	101·5	92·4	9·3
1910	93·7	84·4	8·2
1910	97·1	90·2	8·3
1910	99·4	30·3	7·6
1911	110·3	82·8	7·5
1911	107·0	81·1	5·6
1911	99·7	14·5	4·0
1911	100·1	79·6	3·5
1911	96·5	72·4	2·5
Samples at least 12 years old	50·6	100·4	20·6
	55·2	126·6	26·3
Purified from above	60·1	130·1	25·5

Storax as imported from Asia Minor still retains its fragrance. But shipments from certain ports, notably Trieste and Marseilles, show that the characters are changed, possibly by the partial abstraction of the valuable cinnamic esters. Cinnamic alcohol is now an important article in the perfumery industry, and the natural product is found to be more fragrant than the synthetic. The residual "storax" from the manufacture of this doubtless finds a market.

The following characters and tests are suggested for the official description of purified storax :—

Styrax Purificatus.—The balsam obtained from the trunk of *Liquidambar orientalis*, purified by solution in alcohol filtration and removal of the solvent.

Characters and tests.—A brownish yellow viscous balsam, transparent in thin layers, with an agreeable odour and balsamic taste. Entirely soluble in alcohol and in ether. Heated on a water-bath for 1 hour it should lose not more than 5 per cent. When boiled with H_2SO_4 and $K_2Cr_2O_7$ it evolves an odour of oil of bitter almonds.

Acid and ester values.—Dissolve 2·5 Gm. in 20 c.c. of alcohol, add a few drops of phenolphthalein solution, and titrate with alcoholic N/2 KOH until a permanent pink colouration is produced. Not less than 5·3 and not more than 8·0 c.c. should be required. (Acid No. 60 to 90.) Add to this solution 20 c.c. of alcoholic N/2 KOH potash and heat to boiling for an hour. Titrate back the excess of potash by means of N/2 H_2SO_4. Not less than 9 c.c. and not more than 12·6 c.c. of semi-normal potash should be absorbed. (Ester No. 100 to 140.)

Total cinnamic acid (free and combined).—Evaporate the alcohol from the saponified solution, and dissolve the residue in 50 c.c. of water. Transfer to a separator, wash with 10 c.c. of ether and reject the ethereal layer. Acidify the aqueous solution with N/H_2SO_4 and extract the liberated acids with ether. Evaporate the ethereal solution and extract the residue with 100 c.c. of boiling distilled water. Filter while hot, allow to cool to 15° and collect the crystals of cinnamic acid on a counterbalanced filter. Twice repeat the extraction of the residue with the filtrate heated to boiling, and collect the crystals. Dry the crystals at 100°C. and weigh. Add ·030 Gm. to correct for solubility. At least 0·375 Gm. should be obtained from 2·5 Gm., corresponding to at least 15 per cent. of free and combined cinnamic acid. The crystals obtained should give the reactions of cinnamic acid. Examined by this method the best samples yield 20 to 25 per cent. of total cinnamic acid. (See also *Y.B.*, **1905,** 157; **1908,** 187; **1909,** 84; **1910,** 125.)

Storax, Variation in Quality of. (*Southall's Report*, 1911, **19,** 16.) Storax at present on the market is often of low grade and shows great variation in characters as follows: Soluble in 90 per cent. alcohol, 61·6 to 79·0 per cent.; average, 70·6 per cent. Insoluble in 90 per cent. alcohol 1·45 to 4·20 per cent.; average 2·38 per cent. Free balsamic acid as benzoic, 1·00 to 1·75 per cent.; average 1·40 per cent. Combined balsamic acid as benzoic, 3·91 to 13·07 per cent.; average, 7·37 per cent.

Thapsic and Juniperic Acids, Identity of. J. Bougault. (*J. Pharm. Chim.*, 1911, **3,** 101.) The identity of acid previously named juniperic acid, isolated from the wax of *Juniperus sabina*, with thapsic acid $COOH\cdot(CH_2)_{14}COOH$ from *Thapsia garganica*, is now established. (See *Y.B.*, **1909,** 35; **1910,** 152.)

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Ammonia and Ammonium Carbonate, Determination of, by Titration. J. C. Thomlinson. (*Chem. News*, 1911, **103**, 13.) Free ammonia cannot be titrated using phenolphthalein as an indicator, methyl-orange being usually used; however, when it exists in the free state, and as carbonate, by using phenolphthalein first, and titrating until the liquid assumes a transient pink colouration throughout its entire bulk, a close approximation as to the amount of ammonium carbonate present may be obtained, and by then adding methyl-orange and completing the titration the total ammonia may be determined.

To prove this a solution was made containing 0·78 Gm. free ammonia, NH_3, per 100 c.c., and 3·69 Gm. ammonium carbonate, $(NH_4)_2CO_3$, per 100 c.c. To 10 c.c. of this solution phenolphthalein was added, and then titrated with N/H_2SO_4 of which 8·1 c.c. were required. Calculated as $(NH_4)_2CO_3$, this represents 3·42 Gm. per 100 c.c.

The total ammonia, free and existing as carbonate, in the test solution made above would be, by calculation, 2·16 Gm. per 100 c.c.

A further titration after adding methyl-orange to 10 c.c. of the liquid already titrated for carbonate gave the total amount of N/H_2SO_4 required as 12·5 c.c., representing 2·1 Gm. total NH_3 per 100 c.c.

Methyl-orange commonly used as an indicator for the titration of free ammonia, although not feasible as an indicator in the presence of free CO_2, can hence be used when there is an excess of ammonia in $(NH_4)_2CO_3$ solutions.

Ammonium Persulphate, Separation of Cr, Fe and Al with. R. C. Cowley. (*Chem. and Drugg.*, 1911, **78**, 625.) $Am_2S_2O_8$ acts as a very efficient substitute for Na_2O_2 for the separation of these metals. The precipitated hydroxides are mixed with water in a porcelain capsule, a small quantity of $Am_2S_2O_8$ is added, and the dish is warmed until the precipitate is dissolved. By this means the $Cr_26(OH)$ is converted into a compound of chromic anhydride. On the addition of an alkali the Fe is precipitated as $Fe_26(OH)$ and the Al. and Cr. may be detected in the solution in the usual way. Re-solution of the $Fe_26(OH)$ in acid and reprecipitation with alkali effects a complete separation of the Fe.

The method is specially useful for chemists in foreign countries, where Na_2O_2 is not available, on account of the difficulties which attend its shipment.

Arsenium in Algæ. E. Tassily and J. Leroide. (*Bull. Sci. pharm.*, 1910, **17,** 580.) Arsenium has been found to occur in considerable quantity in the marine algæ enumerated. The figures indicate the Mgm. of As present in 100 Gm. of material, washed until the washings gave no precipitate with $AgNO_3$. When used, this material contained from 20 to 30 per cent. of moisture. *Chondrus crispus*, 0·070 ; *Fucus vesiculosus*, 0·010 ; Corsican moss, 0·025 ; *Laminaria digitata*, 0·050 ; *L. saccharina*, 0·010 ; *L. flexicaulis*, 0·010. Commercial gelose, obtained from undetermined species of algæ gave 0·02 to 0·025 Mgm. in 100 Gm. *Chondrus crispus* of commerce is often bleached with SO_2, which might further increase the amount of As. The above specimen was not so treated. It is stated that this alga is used in large quantities is certain German beers, and may therefore, be the source of the As which is alleged to have been found in some of them. The crude soda ash or kelp resulting from the incineration of *Laminaria*, gave 0·001 Gm. of As in 100 Gm. As 20 tons of the weed gives 1 ton of kelp, it would seem that none of the original As is lost by burning.

Atomic Weights. J. E. Woodhead. (*Pharm. J.*, 1911 [4], **32,** 365.) The author compares the International Weights, 1911, with the suggested rounded-off weights and calculates out the percentage of error for the latter.

Atomic Weights of Pharmacopœias. W. H. Martindale. (*Pharm. J.*, 1911 [4], **32,** 178.) A table is published showing the atomic weights of elements official in eight Pharmacopœias, compared with the International atomic weights, 1911. The adoption of "rounded-off" atomic weights, such as those of the French Codex, is advocated.

Bismuth Benzoates. Godfrin. (*J. Pharm. Chim.*, 1910, **2,** 385.) *Normal bismuth benzoate*, $Bi(C_6H_5CO_2)_3$.—Six Gm. of $Bi3NO_35H_2O$ is dissolved by trituration with a mixture of glycerin, 6 Gm., and distilled water, 12 Gm. To this, a solution of sodium benzoate, 6·2 Gm., glycerin, 6 Gm., and distilled water, 12 Gm., is quickly added, with constant trituration

to break up any aggregated precipitate. The homogeneous mass is then treated, with constant stirring, with 80 c.c. of a 1 : 500 aqueous solution of benzoic acid, and allowed to stand at 10 to 15°C. for 5 to 10 days. The crystalline magma obtained is drained by the aid of the filter-pump, and washed twice successively by suspension in 30 c.c. of aqueous benzoic acid solution saturated at about 15°C. After final draining, the crystals are dried, either at ordinary temperatures in the air, or over H_2SO_4, or at 60°C. The salt forms long bright needles, resembling light quinine sulphate in appearance. These are moistened with difficulty by water; they are quite free from HNO_3, and contain only a trace of free benzoic acid. The latter is easily driven off at 110°–120°C., at which temperature the salt is quite stable; it does not begin to turn yellow or to part with the combined benzoic acid until the temperature reaches 140°C. *Basic bismuth benzoates.*—The salt, $Bi_4O_3(C_6H_5CO_2)_6$, is obtained with difficulty by treating the normal salt with 20 times its weight of absolute EtOH, added gradually, with frequent agitation, and then setting aside, at the ordinary temperature, for 90 minutes in all, then quickly draining. It forms a dense, dull white powder; stable in the air, and not altered by heat below 160°C.; it is decomposed by water, by alcohol, and by ether. It consists of well-formed microscopic cubes. Another basic salt, $Bi_2O_3(C_6H_5CO_2BiO)_{12}$, is obtained by leaving the normal benzoate in contact, for several days, in the cold, with at least 20 times its weight of Et_2O or of 95 per cent. EtOH. It is a yellowish-white powder, partly amorphous and partly indistinctly crystalline under the microscope. A third basic salt, $Bi_2O_3(C_6H_5CO_2BiO)_6$, is obtained by boiling the normal benzoate with at least 35 times its weight of 95 per cent. EtOH. It is a dull white, micro-crystalline powder, apparently composed of minute, clinorhombic prisms. *Bismuthyl benzoate.*—In addition to the above, the salt, $BiOC_6H_5CO_2$, has been prepared as a light, shining crystalline powder, composed of micro-prisms apparently of the clinorhombic system. Under the name of "Lutol," it has been introduced into medicine, as a substitute for bismuth salicylate.

Bleaching Powder, Disinfectant Action of. R. L. Taylor. (*B.M.J.*, 1910, **2**, 1987.) As the result of investigation on the action of air and CO_2 on chlorinated lime, it is considered that CO_2 acts like any other acid and liberates free Cl only and no

hypochlorous acid. Moist air also liberates at first a large volume of Cl, and a little of the acid, and after a time the latter disappears. Fresh bleaching powder probably consists mainly of the compound $CaCl_2O$, and has not the formula $CaCl_2Ca2ClO$ formerly attributed to it. The latter compound is formed only when the bleaching powder is dissolved in water. The absence of $CaCl_2$ is demonstrated by the fact that bleaching powder is not very deliquescent. Also when fresh, it yields practically no soluble portion to treatment with alcohol. The disinfectant action is due primarily to the Cl liberated.

Calcium, Determination of Minute Quantities of, in Presence of much Mg. C. Liesse. (*Annales Chim. analyt.*, 1911, **16,** 7.) The method depends on precipitating the Ca as CaC_2O_4 in solutions so dilute as to keep the MgC_2O_4 dissolved. From 1 to 2 Gm. of the substance is treated with 20 to 25 c.c. of HCl, then diluted to 100 or 200 c.c. with water, and made just alkaline to phenolphthalein with AmOH. Insoluble matter is then removed by filtration; the filtrate is diluted to 1,500 c.c. for each Gm. of substance taken, this dilution being made in the cold. $Am_2C_2O_4$ crystals, 4 Gm., is then added, and sufficient acetic acid to give an acid reaction. After standing 2 hours, with occasional agitation, the liquid is filtered and the precipitate is washed with 150, 150, and 150 c.c. of hot water. The precipitate is then gently ignited, and weighed as $CaCO_3$. Although the volume of liquid required to be filtered is considerable, filtration is very rapid.

Co and Ni, New Reaction to Separate. H. Weil. (*Bull. Soc. Chim.*, 1911 [4], **9,** 20.) Co salts in perfectly neutral solutions are precipitated as $CoCrO_4CoO$ by adding K_2CrO_4 solution 1 : 10. This occurs in the cold in dilutions containing more than 1 : 500. If less than this is present, the mixture must be boiled. A precipitate will then be obtained with 0·000032 Gm. of Co. The precipitate is reddish-brown and adheres to the glass. It is soluble in very dilute acids, and in AmOH. Ni is also precipitated as $NiCrO_42NiO$, but only very slowly in the cold. It is chocolate brown and non-adherent. Mixtures of Ni and Co may be separated by adding the K_2CrO_4 reagent in the cold, to perfectly neutral solutions, and filtering at once. The Co is precipitated and the greater part of the Ni remains in solution. On boiling, this is precipitated. If much Co and but

little Ni are present, the precipitate obtained after filtering and boiling the filtrate is redissolved in dilute solution of AmOH 1 : 1 and concentrated. If Ni is present, its characteristic precipitate will appear, while with Co it changes to dull green. If Ni predominates, no precipitation of Co occurs in the cold ; the precipitate obtained on boiling is filtered and redissolved as above. Any Co. present will then be indicated by the characteristic green precipitate on concentrating. Excess of K_2CrO_4 must be removed from the precipitates of mixed basic chromates by washing before redissolving in the AmOH. One part of Ni can be thus detected in 100 of Co.

Copper Citrate, Composition of Commercial. W. A. Puckner and L. E. Warren. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1011.) In view of the variability of the salt as found in American commerce, it is suggested that it should be required to answer the following tests :—

Copper citrate should contain the equivalent of 34 to 36 per cent. of Cu. If about 1 Gm. of copper citrate be dissolved in 20 c.c. of diluted HCl, the solution diluted to 200 c.c. with hot distilled water, the mixture saturated with H_2S, filtered, and the filtrate evaporated nearly to dryness on the water-bath, the residue should respond to the usual tests for citric acid.

If 0·5 Gm. of copper citrate be dissolved in 10 c.c. of diluted HCl and 1 c.c. of $BaCl_2$ solution be added, no turbidity should at once occur (limit of sulphate).

A solution of 0·5 Gm. of the salt in 10 c.c. of diluted H_2SO_4 should not evolve any odour of acetic acid when boiled.

The salt should be free from nitrates, chlorides and carbonates.

Copper, Distribution of, in Organized Nature. J. W. Dougal. (*Pharm. J.*, 1911 [4], **32,** 405.) The paper deals with the occurrence of copper mainly in animal pigments, and specially that of the common lobster, *Homarus vulgaris*.

Ferrous Sulphate. (*Southall's Report*, 1911, **19,** 28.) It is impossible to obtain the official requirement of 99·4 per cent. $FeSO_4 \cdot 7H_2O$ in the crystal form, the amount present rarely exceeding 96 per cent. in samples of excellent colour. This is probably due to occluded mother liquor in the crystals, and it is suggested that if so high a standard is to be maintained the granular sulphate of the B.P. 1885 should be restored.

Hypophosphites, Determination of, in Pharmaceutical Preparations. K. Feist. (*Apoth. Zeit.*, 1911, **23**, 253.) The reduction of $HgCl_2$ to HgCl by hypophosphites may be applied to the gravimetric determination of the acid and of its salts. The reaction takes place according to the equation $H_3PO_2 + 2H_2O + 4HgCl_2 = 2Hg_2Cl_2 + 4HCl + H_3PO_4$. The method gives accurate results with $Ca(PH_2O_2)_2$, provided that a large excess of $HgCl_2$ is employed and the mixture is digested at 65°C. for 6 hours. It cannot be used with syrups, because of the reducing action of the sugar. For these, after evaporating to dryness with ammonium vanadate and HNO_3, the phosphate formed is determined in the usual manner by the molybdate method. [But this would only indicate the total P present, not the amount present as hypophosphite.—Ed. *Y.B.*]

Iodine, Commercial, Presence of Pb in. (*Evans' Analytical Notes*, **1910**, 36.) Lead has again been met with as an impurity in commercial iodine ; as much as 0·4 per cent. has been found.

Iodometric Titrations, Methylene Blue as Indicator for. F. S. Sinnatt. (*Analyst*, 1910, **35**, 309.) A solution of 0·05 Gm. of methylene blue in 1.000 c.c. of water forms a convenient substitute for starch in iodometric titrations. One c.c. of this indicator to 50 c.c. of liquid for titration is a convenient quantity. The change of colour from blue to yellowish green and finally yellowish-brown is very evident. Ten c.c. of the indicator requires only 0·15 to 0·25 c.c. N/100 I solution to cause the first change.

Lead, Determination of, in Beer. A. W. Knapp. (*J.S.C.I.*, 1911, **30**, 165.) One hundred c.c. of beer is evaporated to about 20 c.c. in a porcelain dish, which is as large as will conveniently go into a muffle. Ten c.c. of HNO_3 is carefully added, and the evaporation continued until there is about 4 c.c. of a viscous liquid. One Gm. of MgO is well mixed with the syrup and the whole dried and ignited in an open muffle till the ash is white. The ash is dissolved in 15 c.c. of dilute HNO_3, neutralized with dilute AmOH, made acid with dilute acetic and diluted to 100 c.c. The small amount of insoluble matter is allowed to settle, and 50 c.c. of this solution in a Nessler glass is treated with 3 c.c. saturated H_2S solution, and compared with standards put on at the same time.

To make the standard solution of lead, a strong solution

containing 1·831 Gm. of lead acetate, and 6 c.c. of glacial acetic acid, per 100 c.c., is first prepared. One c.c. of this solution is diluted to 100 c.c. to obtain the standard solution (1 c.c. = 0·0001 Gm. of Pb. The chief source of lead in beer is considered to be the service pipe. These are generally tin washed, or lined with block tin; but even such pipes may have wiped lead joints.

Lithium, Determination of. E. Murmann. (*Z. Anal. Chem.*, 1911, **50,** 171.) Li may be determined in a mixture containing its chloride, with those of Na and K, by extraction with pyridine, in which the latter salts are insoluble. The pyridine extract is evaporated to dryness, and a slight excess of dilute H_2SO_4 is added to the residue, after which the mixture is again evaporated, and Li_2SO_4 finally ignited and weighed. Any trace of Li remaining with the chloride residue may be recovered by dissolving this in water, evaporating, and again extracting with pyridine. The alkali chloride mixture must not be heated to redness, or very appreciable loss of Li occurs.

Mercuric Iodide, Determination of, in Ointment. R. R. Hallaway. (*Pharm. J.*, 1911 [4], **32,** 45.) Apart from the method of Adam (*Y.B.*, **1910**, 135), there appears to be no published process for determing HgI_2 in ointment. This process entailing the employment of petroleum ether and H_2S is not convenient for use in the pharmacy. The following modification of Rupp's method (*Y.B.*, **1907,** 103) was finally adopted. About 2·5 Gm. of ointment is weighed in a tared beaker. This is warmed with KI solution and the melted ointment shaken round until the red colour has disappeared. The beaker is then cooled, and the liquid filtered into a stoppered flask. The lard is then washed twice with more KI solution as before, and the washings also added to the flask. To the flask are added 20 c.c. solution of KOH, and 3 c.c. formaldehyhe solution, and the liquid is well shaken. After standing over half an hour, 25 c.c. acetic acid, B.P., is added, and 25 c.c. of N/10 iodine solution, the flask being well shaken until all the mercury is dissolved. The excess of iodine is then titrated with N/10 sodium thiosulphate solution.

Mercury Salts, Volatility of, in Aqueous Vapour. T. Lecco. (*Apoth. Zeit.*, 1910, **25,** 225.) Hg and its salts in the presence of organic matter are distinctly volatile in aqueous vapour, so that a distillate therefrom will contain quite notable quantities of Hg in suspension, in the metallic state. Sometimes the metal

may be so finely divided that it is barely visible; occasionally enough will be present to form an immediate precipitate. When mixtures of organic matter with mercurial salts, such as calomel or corrosive sublimate, are distilled, these compounds are reduced to the metallic state, and then quite a quantity of the metal will be carried over on distillation. In the course of toxicological examination, therefore, mercurials should be treated as volatile poisons.

Mercury, Volumetric Determination of, by Means of Ammonia. G. Bressanin. (*Ann. Chim. analyt.*, 1910, **15**, 413.) The original method of Archetti of precipitating $HgCl_2$ solution with excess of AmOH and then titrating the amount of free AmOH remaining, thus modified, is claimed to give results comparable in accuracy with those obtained gravimetrically. Forty c.c. of N/10 AmOH solution is run into a stoppered 100 c.c. flask. Twenty c.c. of the solution of $HgCl_2$, approximately N/10 concentration, is then added, and sufficient distilled water to make the whole up to 100 c.c. After standing well stoppered, until clear, 25 c.c. is pipetted off and titrated with N/10 acid, with litmus indicator. To obtain satisfactory results, the excess of AmOH over $HgCl_2$ should be in the molecular ratio of 4 : 1. Under these conditions 1 c.c. of N/10 AmOH is equivalent to 0·01355 Gm. of $HgCl_2$.

Ozone generated by a New Chemical Method. P. Malaquin. (*J. Pharm. Chim.*, 1911, **3**, 329.) When ammonium persulphate is treated with nitric acid, O,O_3 and N are evolved. The action takes place very slowly in the cold; more rapidly at 45–50°C. and becomes active at 65–75°. The amount of ozone formed is 3 to 4 per cent. of the total gas; with 4 to 4·5 of N; less than 1 per cent. of CO_2, the rest being O. The proportions which give the best results are $(NH_4)_2S_2O_8$, 4; HNO_3, sp. gr. 1·334, 3. A special glass apparatus for generating the gas is figured. Other alkali persulphates do not yield so much ozone as the ammonium salt.

Silver, Reagent to Detect Alloys in. A. Heinmann. (*Annales Chim. analyt.*, 1911, **16**, 166.) Nitric acid, sp. gr. 1·27, 40 c.c.; glacial acetic acid, 50 c.c.; water, 50 c.c., are mixed. This reagent is applied to the metallic streak obtained by rubbing the article to be tested against a touchstone, basanite or Lydian

stone. A very small amount of copper in silver alloy may be thus determined.

Sodium Persulphate, Presence of Ammonia in Some Commercial Samples. P. Lemaire. (*Bull. Soc. Pharm. Bordeaux*, 1910, **50,** 306.) Huguet has proposed the use of sodium persulphate as the reagent for determining the total N in urine. Although the method is convenient, it is necessary to test the persulphate for NH_3, which is, according to the author, a frequent impurity in the commercial salt. If present, the amount must be determined, and the due correction made in any N determinations.

Strontium Salts. (*Southall's Report*, 1911, **19,** 30.) Commercial samples of strontium salts are frequently far from pure; the presence of much Pb in samples of the carbonate has been noted previously; recently a sample consisting largely of $SrSO_4$ has been met with. A parcel of $Sr2NO_3$ examined proved to contain a considerable proportion of Ba compounds.

Sulphuretted Hydrogen Apparatus. A. W. Nunn. (*Pharm. J.*, 1910 [4], **31,** 6.) A compact portable form of H_2S apparatus is figured and described.

Tinned Foods, Determination of Tin in. H. Schreiber and W. C. Taber. (*U.S. Dept. of Agric., Bureau of Chem.*, Circular No. 67, 1911, 1.) The sample of material is minced, and 100 Gm. of the mass is mixed in an iron crucible with 10 Gm. of MgO. After the addition of 50 c.c. of a solution containing 150 Gm. of NaOH and 100 Gm. of Na_2CO_3 per litre, and about 75 c.c. of EtOH, the mixture is evaporated on a water-bath. The crucible is now placed on a hot-plate until its contents are thoroughly dry, the final ignition being carried out in a muffle furnace. When all the carbon has been destroyed, the ash is cooled, taken up with water, and transferred to a beaker. Forty c.c. of H_2SO_4 (1 : 1) are added, the crucible being rinsed out with 10 c.c. of the acid, and, after the addition of 50 c.c. of strong H_2SO_4 and 30 c.c. of strong HNO_3, the mixture is heated until H_2SO_4 fumes are evolved. The mixture is then diluted to a volume of about 400 c.c., treated with AmHS, acidified with H_2SO_4, diluted with boiling water to a volume of 1 litre, and treated with H_2S. After the lapse of about 16 hours, the precipitate is collected on a filter, washed with a solution containing

$HC_2H_3O_2$ and $AmC_2H_3O_2$, then dissolved in KOH solution, and filtered. The filtrate, together with the washings, is neutralized with HCl, 1 c.c. of strong HCl is added in excess, the mixture is heated for 20 minutes on a water-bath, and placed aside overnight. The precipitate is then collected, washed with the $AmC_2H_3O_2$ solution and water until free from Cl, ignited and weighed as SnO_2.

Vichy Water and Salts, Presence of Lithium in. M. A. Mallat. (*J. Pharm. Chim.*, 1910, **2**, 543.) Natural Vichy water, and the genuine salts obtained by its evaporation and converted into bicarbonates by exposure to carbon dioxide, invariably contain lithium, in traces, but sufficient to give a very marked and characteristic spectrum visible with a small pocket spectroscope. Certain samples of the water purchased in Paris failed to give this reaction, and were fictitious. The synonym "Sel de Vichy" for pure sodium bicarbonate given in the French Codex is inaccurate and misleading. Genuine natural Vichy salts should contain lithium.

Zinc Dust, Commercial, N in. C. Matignon. (*Comptes rend.*, 1911, **152**, 1309.) N, in the form of zinc nitride, Zn_3N_2, is a constant impurity in commercial Zn dust, in quantities amounting from 0·14 to 0·42 per cent. of the nitride. Its presence is easily detected when the powdered Zn is treated with KOH, when NH_3 is given off. Metallic Zn occasionally contains traces, but not invariably, and always much less than the powdered metal. When Zn is very slowly distilled, so as to facilitate the formation of Zn_3N_2, the amount present may be as much as 1·2 per cent. Commercial zinc whites contain no N.

Zinc Sulphate, Manganese as an Impurity in. B. Collette. (*Pharm. J.*, 1911 [4], **32**, 5.) Since red zinc ore, and franklinite, both of which contain notable quantities of Mn, are now largely used as a source of Zn, the presence of Mn as an impurity in $ZnSO_4$ and other Zn salts is of frequent occurrence. The following test serves to detect this impurity.

The zinc sulphate is dissolved in distilled water, and excess of AmOH added; on standing exposed to the air any Fe and Mn present separate as hydroxides. These are filtered out and dissolved in a small quantity of dilute HNO_3; the solution is diluted with distilled water and raised to boiling temperature. One c.c. of $N/10AgNO_3$ is added, and then 10 c.c. of 10 per cent.

solution of $Am_2S_2O_8$. A pink or red colouration, due to the formation of permanganate, indicates the presence of Mn. The test may be made quantitative by titrating the permanganate with a standard solution of Na_2AsO_3. It is suggested that the official salts of Zn should be required to be free from Mn.

ORGANIC CHEMISTRY : UNCLASSIFIED

Acetone, Commercial, Valuation of. (*Evans' Analyt. Notes*, **1910,** 5.) Four samples gave the following figures :—

	No. 1 (Pure rectified).	No. 2 (Rectified).	No. 3 —	No. 4 (Chemically pure).
Colour . .	Absent	Absent	Slight yellow tinge	Absent
Sp. gr. . .	0·7975	0·7978	0·7965	0·7965
B.p . . .	55·2°–56·5° 60% distils below 56°	55·3°–58·6° 60% distils below 57·6°	55·3°–57° 60% distils below 56°	56·4° Constant
Ketone. .	97·4%	97·1%	99%	100%
Acidity .	Practically absent	Practically absent	Practically absent	Practically absent
Oxidizable impurities	$K_2Mn_2O_8$ Not reduced in 5 minutes	$K_2Mn_2O_8$ Partially reduced in 2 minutes	$K_2Mn_2O_8$ Reduced in 1 minute	$K_2Mn_2O_8$ Not reduced.
Other impurities	Faint trace Methyl Alcohol	Decided trace of Methyl Alcohol with a little higher Ketone	Ketone Oil decidedly present	None detected

No single character is sufficient to determine the purity of a sample. The most convenient method of assay is that of Denigés : 5 Gm. of levigated HgO is dissolved in a warm mixture of strong H_2SO_4, 20 c.c., and water 100 c.c. ; 25 c.c. of this reagent are required per 0·5 Gm. of acetone.

Twenty c.c. of the acetone is made up to 2,000 c.c. with water. Ten c.c. is pipetted off into a flask, adding 40 c.c. of water, and 50 c.c. $HgSO_4$ reagent. On standing on a water-bath for 10 minutes the acetone (and other ketones) are completely precipitated. After cooling the precipitate is collected on a tared filter, washed with 150–200 c.c. of cold water, dried at 100–

110° until constant; the weight × 0·052 gives the weight of acetone in 10 c.c. of the dilute solution.

Acid Carbolic, Errors of the Ph.G. V. Tests for. F. Rashig. (*Pharm. Zeit.*, 1910, **55**, 1055.) The range of b.p., 178–182°C., is too wide for acid of the official degree of purity. The statement that a 1 : 50,000 aqueous solution will give a white flocculent precipitate with Br reagent is wrong. At ordinary temperatures it does not give even a turbidity; nor does a 1 : 40,000 solution at 25°C., as in summer. Stronger solutions give a turbidity which is not flocculent, but which forms a crystalline precipitate on standing. It is not white, but yellowish. The statement that a 1 : 15 aqueous solution should be neutral, and not redden litmus paper is also wrong. Pure phenol solution of this strength reddens blue litmus, as was shown when the statement was made in the Ph.G. III. that this solution should be neutral.

Acid Formic, Determination of, in Acetic Acid. H. Delehaye. (*Annales des Falsific.*, 1910, **3**, 386.) A reagent of $HgSO_4$ is prepared as follows: Yellow HgO, 10 Gm., is suspended in a graduated 250 c.c. flask in 20 c.c. of hot water. Then H_2SO_4 is added, drop by drop, until the HgO is dissolved, using heat if necessary. When cold, the volume is made up to 250 c.c. The quantity of formic acid to be operated on with 50 c.c. of this reagent is between 0·10 and 0·20 Gm. If the amount present in the acetic acid be not known, a preliminary determination must be made first, followed by a more exact one. The acetic liquid containing between 0·10 and 0·20 of formic acid is mixed with 50 c.c. of the $HgSO_4$ reagent, in a conical flask fitted with a long tube-condenser, and heated in the boiling water-bath for 45 minutes. The liquid is then quickly cooled down under running water and filtered through a tared filter, this filtrate being measured for the necessary correction for the solubility of Hg_2SO_4 (0·20 Gm. for each 100 c.c.) The precipitated Hg_2SO_4 is then transferred to the filter, washed with a little saturated solution of the same salt, and finally with a mixture of equal volumes of EtOH and water. It is then dried at 110°C. and weighed. The weight found, after adding the above correction × 0·0927, gives the weight of formic acid present in the acid taken. (See also *Y.B.*, **1909**, 37.)

Acid Formic, in Glacial Acetic Acid, Determination of. H.

Fincke. (*Apoth. Zeit.*, 1910, **25,** 727.) Ost and Klein in 1908 showed that commercial glacial acetic acid commonly contained formic acid, different samples showing various proportions up to 0·6 per cent., and Pikos showed that it was quite easy to produce acetic acid perfectly free from this impurity. Recent examination of samples of the acid supplied for pharmaceutical use show that there has been no improvement in this respect. Five specimens all contained formic acid, in quantity from 0·018 to 0·806 per cent. To determine the amount present, 5 c.c. of the glacial acid, 5 Gm. of sodium acetate, 40 c.c. of 1 in 20 solution of $HgCl_2$, and 30 c.c. of water, should be heated in an Erlenmeyer flask for 2 hours in a boiling water-bath under a reflux condenser, the part of the flask containing the liquid being fully immersed ; the precipitated HgCl is collected in a Gooch crucible, dried, and weighed ; its weight multiplied by 0·0977 gives the weight of formic acid.

Acid Formic, Quantitative Determination of. H. Franzen and F. Egger. (*J. prackt. Chem.*, 1911, **83,** 323.) HCOOH may be determined when converted into the Na salt by means of $HgCl_2$, which it reduces to HgCl. The latter may then be collected and weighed. One mol. HCOONa = 2 mols. HgCl. For this purpose a reagent is prepared with $HgCl_2$, 200 Gm. ; $NaC_2H_3O_2$, 300 Gm. ; NaCl, 80 Gm. ; in water, 1,000 c.c. The mixture is allowed to stand for two days, then decanted from the precipitate. No further precipitate will be formed. This is added to the formate solution in the proportion of 50 c.c. to the litre ; the strength of the formate solution not exceeding 0·5 Gm. HCOOH in that volume. The mixture is then heated for 3 to 3½ hours on the water-bath, when the precipitated HgCl is washed, collected, dried, and weighed.

Acid Hydrocyanic, Volumetric Determination of, and in Presence of Benzalcyanhydrin. L. Rosenthaler. (*Arch. Pharm.*, 1910, **248,** 529.) The fact that free HCN liberates HCl from $HgCl_2$ is made use of in the method. N/10 solutions of acid and alkali are used, with iodeosin indicator, also a solution of 27·1 Gm. of $HgCl_2$ and 11·7 Gm. of NaCl in 500 c.c. of water. The liquid containing the HCN is neutralized with acid or alkali after the addition of iodeosin and ether, when the aqueous portion is rose-coloured. Excess of $HgCl_2$ is added, the liquid shaken, and titrated with the alkali till the rose colour is restored. A further addition of $HgCl_2$ should not destroy the colour. To

determine the total HCN in a mixture of the acid and benzalcyanhydrin, excess of the standard alkali is added to the liquid which has previously been rendered neutral to iodeosin. After shaking, $HgCl_2$ solution is added, and the liquid again shaken. Standard acid is now added till the colour is removed. In order to determine the free HCN, the liquid to be titrated is mixed with 20 c.c. of saturated Na_2SO_4 solution and neutralized after the addition of about 50 c.c. of Et_2O and 10 drops of the iodeosin solution. $HgCl_2$ solution is now added, the mixture shaken, and the aqueous part drawn off. The Et_2O solution is washed with Na_2SO_4 solution, which is added to the portion first drawn off. The whole is then titrated with alkali. The decomposition of the benzalcyanhydrin is thus avoided. The method is suitable for the determination of the free and combined HCN in essential oil of bitter almonds.

Acid Hydrocyanic, Determination of, in Vegetable and Animal Tissues. A. D. Waller. (*Proc. Roy. Soc.*, 1910, B, **82,** 574; *J.S.C.I.*, 1910, **29,** 1180.) The method is based on the colour reaction between picric acid and HCN. The picrate solution employed contains 0·05 per cent. of picric acid and 0·5 per cent. of $Na_2{\cdot}CO_3 10H_2O$. Equal volumes of picrate fluid and 0·002 per cent. HCN are left for 24 hours in an incubator at 40°C., and the red colour obtained (corresponding to 1 Mgm. of HCN per litre) is used as a standard for colorimetric comparison. The colouration is unaffected by light or by boiling, and is of such strength that the solution will bear dilution to 10 times its volume when very weak cyanide solutions are being investigated. The examination of tissues is effected by distillation with dilute acid, the distillate being received in a suitable quantity of picrate fluid, which is then allowed to stand for at least an hour in an incubator at 40°C. before the tint is compared with the standard. The errors of manipulation and reading are estimated not to exceed 10 per cent. of the minute quantities measured, and the method has been tested with excellent results on numerous animals poisoned with HCN, as well as in a case of HCN poisoning in man. It is found that the poison goes to some organs (heart and brain) rather than to others (the muscles). The method has also been used to show that the evolution of HCN from laurel leaves is a *post mortem* phenomenon.

Acid Hydrocyanic, in Plants, Source of. A. Jorissen. (*Bull. Acad. roy. Belg.*, **1910** [4], 224; *J. Pharm. Chim.*, 1910,

2, 358.) Prussic acid may be formed at the expense of nitrates or of nitric acid and of organic compounds in plant tissues. It has recently been found that when dilute nitric acid is allowed to react at ordinary temperatures for a length of time on many substances which occur naturally as plant constituents HCN is formed. Thus, morphine, strychnine and especially vanillin, yield notable and increasing amounts of HCN when left in contact with 6·3 Gm. of nitric acid in 100 c.c. of water, for several days. The formation of the acid takes place in the dark as well as in light; it is not arrested by the presence of HNO_2. Urea somewhat retards the process, but asparagin has no influence thereon. It is to be noted that the acidity of this HNO_3 is not greater than the acid equivalent of many fruit juices. It has been established that the HCN is formed prior to the process of distillation for its identification.

Acid Hydrocyanic, Modified Vortmann's Nitroprusside Reaction for. H. J. Van Giffen. (*Chem. Zentr.*, 1910, **2**, 1327.) In presence of alcohol, the following modification of the test is recommended: A little $NaNO_2$ is dissolved in the solution to be tested, 2 or 3 drops of Fe_2Cl_6 solution are added, and after shaking, the mixture is acidified carefully with dilute H_2SO_4, then heated to boiling, and excess of Fe_2Cl_6 precipitated with AmOH. After filtering, the solution is evaporated to dryness, the residue dissolved in water, the solution cooled with ice, and a drop of AmHS solution added, when in the presence of HCN a violet colouration will occur, this then passes from blue and green to yellow.

Acid Lactic, Volumetric Determination of. E. Elvove. (*Amer. J. Pharm.*, 1911, **83**, 14.) Murray has shown that the assay requirements of the U.S.P., 1900, indicating a supposed strength of 75 per cent., do not agree, theoretically, with the sp. gr. therein given—"about 1·206 at 25°C." This density theoretically represents a lactic acid content of 85 to 88 per cent. This points to a defect in the method of titration. The author has found that the official process of titration, during boiling, to a faint pink colour with phenolphthalein gives results markedly below the truth. A more accurate and convenient process is the following method of cold titration. About 2 Gm. of the acid, accurately weighed, is treated with 50 c.c. of N/NaOH solution, well mixed, and set aside for 30 minutes. The excess of alkali is then titrated back in the usual manner, in the cold,

with N/H_2SO_4, and phenolphthalein indicator. Each c.c. of N/NaOH thus found to be used up is equivalent to 0·09 Gm. of lactic acid. Seven commercial samples thus tested gave from 86·1 to 89·82 per cent. of lactic acid. The same samples titrated directly at normal temperatures gave only 71·95 to 72·71 per cent.; other methods of manipulation gave slightly higher results. By boiling the acid with excess of alkali, cooling, and titrating back, in some instances, results identical with the above cold titration were obtained, and in others only a few tenths per cent. higher.

Acrolein, New Reaction for. E. Voisenet. (*J. Pharm. Chim.*, 1910, **2,** 214.) Two reagents are prepared. (1) HCl, sp. gr. 1·18, 200 c.c., is treated with solution of KNO_2, 3·6 : 100, 0·1 c.c. (2) Water, 5 to 7 c.c., is added to the white of one egg, and the mixture is well beaten up, then strained with pressure, through a cloth. Five c.c. of the solution to be tested is treated in a test tube with 1 c.c. of the albumin solution, then with 18 c.c. of the acid reagent. After mixing, the tube is plunged in a water-bath at 50°C. In a few minutes a colour will appear, which varies in shade and characters with different aldehydes. In presence of acrolein 1 : 2,000 to 1 : 5,000 it is green, and with less, bluish green. It will detect 1 : 1,000,000. An absorption band is very marked in the red. The colours are very stable. No other aldehyde tested gives a similar green colour.

***a*-Elaterin, Constitution of.** C. W. Moore. (*Proc. Chem. Soc.*, 1910, **26,** 215.) The following formulæ have, at various times, been suggested for elaterin: $C_{20}H_{28}O_5$ (Zwenger); $C_{22}H_{30}O_6$ (Thoms); $C_{24}H_{34}O_6$ (Hemmelmayr); and $C_{28}H_{38}O_7$ (Berg). The present author has now obtained results which prove the correctness of the empirical formula suggested by Berg. The presence of an acetyl group in elaterin has been confirmed, but it has been shown that this substance contains no ketonic or aldehydic group. Two crystalline substances have been obtained by the oxidation of "elateric acid," which have been shown to possess the formulæ $C_{24}H_{32}O_4$ and $C_{24}H_{30}O_5$ respectively. The latter of these is a diketone, and has been designated *elaterone*. On distillation with zinc dust, elaterin yields 1 : 4 dimethylnaphthalene.

The results so far obtained indicate that the formula of elaterin may be represented as follows—

$$C_{25}H_{33}O\begin{cases}-OH\\-OH\\-O\cdot CO\cdot CH_3\\-CO\\\quad —\\-O\end{cases}$$

(See also *Y.B.*, **1910,** 168.)

Antifebrine and Exalgine, Test to Distinguish. V. Zotier. (*L'Union pharm.*, 1910, **51,** 255.) About 0·05 Gm. of the substance is treated with 10 drops of HCl, boiled for 2 minutes, and then cooled. Another 5 drops of HCl is added, then 1 drop of $NaNO_2$ solution 1 per cent. After allowing reaction to proceed for 10 minutes, 1 c.c. of phenol is added, and then enough H_2SO_4 to give a homogeneous mixture. Of this 0·5 c.c. is taken and treated with enough NaOH solution to give a clear liquid. Exalgine. methylacetanilide, gives a fine blue ; and antifebrine, acetanilide, a yellow colour. Mixture will vary from yellowish to green according to the proportion of either ingredient. It is important that the details of the test be strictly followed. Thus if the boiling with HCl is too short, the final colour with exalgine will be green, as though acetanilide were present. The amount of $NaNO_2$ must not be exceeded, or a nitrosophenol, giving the same reactions as nitros-amines, will be formed, and, for the same reason, the reaction of the nitrite must be for the time indicated.

Ash Standards in Drugs, Value of. C. H. La Wall and H. A. Bradshaw. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 751.) It is considered that ash determinations are valuable for determining the quality of crude drugs, and that ash standards should be included in the pharmacopœia. The ash has been determined in a large number of drugs, and the results, in percentages, obtained with the " air dry " drug are given as follows : Absinthium, 8·8 to 13·45 ; acacia, 2·85 ; aconite root, 3·4 to 4·7 ; almond meal, 3·75 ; aloes socotrine, 0·1 (*sic* ! 1·0 ?) ; aloin, 0·7 ; althea root, 5·49 ; angelica root, 5·15 ; anise (pimpinella) 5·7 to 9·9 ; anthemis, 4·7 to 5·87 ; apocynum, 3·4 ; areca nut, 1·7 ; arnica flowers, 6·55 to 8·7 ; arnica root, 9·07 ; asafetida, 22·9 ; basil leaves, 13·5 to 15·9 ; belladonna leaves, 11 to 15·2 ; black hellebore, 6·6 ; blessed thistle, 18·36 ; bryonia, 2·8 ; buchu, long, 5·55 ; buchu, short, 4·2 to 5·5 ; buck-

thorn berries, 2·6 ; buckthorn bark, 3·2 to 5·2 ; burdock root, 4·67 to 12·6 ; calabar bean, 2·8 ; calamus, 2·4 to 4·2 ; calendula, 7·2 to 8·5 ; calumba, 6·95 to 10·4 ; cannabis indica, 9·6 to 24·0 ; cantharides, 5·7 to 6·53 ; capsicum, 4·4 to 5·75 ; caraway, 7·8 ; cardamom, 3·7 to 7·9 ; cascara, 4·9 ; cedron seed, 1·14 ; celery fruit, 7·2 ; centaury herb, 3·0 to 5·08 ; chestnut leaves, 3·2 to 4·4 ; chimaphila, 3·0 ; chondrus, 15·5 ; cimicifuga, 9·65 ; cassia, 10·3 ; cinnamon, 3·4 ; Saigon cinnamon, 2·4 to 4·8 ; cinchona, red, 6·5 ; cinchona, yellow, 2·4 ; cloves, 5·25 to 6·4 ; coca, 10·6 ; cocculus indicus, 4·18 to 4·67 ; cochineal, 3·28 ; coffee, roasted, 3·03 to 4·05 ; colchicum corm, 2·5 to 3·5 ; colocynth, 12·38 ; coltsfoot leaves, 5·6 to 8·3 ; comfrey root, 6·5 to 7·08 ; condurango, 6·7 to 8·84 ; conium leaves, 14·6 ; conium fruit, 6·85 ; convallaria root, 9·26 ; coriander fruit, 4·55 to 8·1 ; cotton root bark, 4·3 to 6·1 ; crocus stigmata, 4·1 ; cubeb, 5·7 to 6·1 ; cousso, 20·7 ; digitalis leaves, 6·75 to 8·9 ; dulcamara, 4·3 ; elm bark, 9·7 ; ergot, 2·46 to 2·7 ; eucalyptus leaves, 6·3 ; euonymus bark, 11·1 ; eupatorium, 7·5 ; euphorbia pilulifera, 3·0 ; fennel fruit, 6·83 to 11·8 ; feverfew herb, 5·6 ; fœnugreek, 3·07 ; gelsemium, 1·4 : genista herb, 2·4 ; gentian root, 2·3 to 3·7 ; geranium, 6·4 ; ginger, African, 3·5 to 5·55 ; ginger, Jamaica, 3·75 ; grains of paradise, 2·0 ; granatum, 14·6 to 17·4 ; grindelia, 6·3 ; hæmatoxylon, 4·1 ; hedeoma herb, 16·9 ; henna, 8·76 ; hepatica leaves, 9·3 ; horsenettle leaves, 6·3 ; hydrastis, 9·15 ; hyssop, 15·2 ; ipecacuanha, 2·7 to 3 ; jaborandi, 4·8 ; jalap, 4·2 ; juniper, 2·3 to 2·8 ; kava-kava, 5·2 ; kino, 5·9 ; krameria, 2·55 ; lactucarium, 5·72 ; larkspur seed, 4·5 to 5·5 ; lavender flowers, 6·6 ; leptandra, 7·1 ; licorice, Russian, 4·75 ; licorice, Spanish, 3·85 ; linden flowers, 4·8 ; lobelia herb, 8·8 to 14·5 ; lycopodium, 1·3 to 2·45 ; mace, 1·6 to 3·45 ; male fern, 2·57 ; mallow flowers, 9·44 ; manna, 1·06 to 6·5 ; marjoram leaves, 11·6 to 12·5 ; marrubium, 12·8 ; matico, 16·1 to 16·8 ; matricaria, 9·65 to 11·68 ; mezereon, 3·8 ; mullein, 24·9 ; mustard, black, 5·3 to 7·5 ; mustard, yellow, 4·4 to 5·2 ; myrrh, 3·02 ; nettle herb, 1·60 ; nutmeg, 1·5 to 2·5 ; nux vomica, 0·9 to 1·6 (10 *sic* ! 1·0 ?) orange peel, bitter, 3·1 ; orange peel, sweet, 3·35 to 3·75 ; pansy herb, 8·7 ; paprika, 5·0 to 7·7 ; pareira brava, 2·9 ; parsley seed, 6·61 to 9·1 ; passion flower, 23·15 ; pepper, black, 4·8 to 10·5 ; peppermint, 10·1 to 11·15 ; pimenta, 3·3 to 4·25 ; podophyllum, 3·6 ; poke root, 8·3 to 14·0 ; pulsatilla herb, 7·4 to 9·95 ; pyrethrum root, 6·1 ; quassia, 2·4 ; quercus alba, 6·8 ; quillaia, 9·1 to 9·5 ; quince seed, 3·6 to 3·9 ; rhubarb, 8·2 ; rose leaves, red, 3·9 ;

rosemary herb, 5·1 ; rubus, 7·1 ; rumex, 6·1 ; sabadilla seed, 4·45 ; salvia, 3·8 to 8·0 ; sanguinaria, 4·55 ; sassafras bark, 4·15 ; savoury herb, 11·9 to 12·5 ; scopola root, 6·65 ; senega root, 5·05 ; senna, Alexandrian, 7·5 to 8·9 ; spearmint herb, 9·7 ; squill, 2·7 ; stramonium leaves, 18·55 to 19·0 ; strophanthus seed, 6·6 ; tansy herb, 9·25 ; thyme herb, 7·4 to 10·2 ; tragacanth, 2·45 to 2·7 ; triticum, 3·0 to 3·65 ; turmeric, 6·0 to 9·2 ; valerian root, 20·15 ; veratrum viride, 14·95 ; viburnum opulus, 3·35 ; viburnum prunifolium, 7·30 ; white agaric, 1·5 ; wild cherry bark, 3·4 ; witch hazel leaves, 5·55 ; woodruff herb, 11·22 ; wormseed, American, 7·0 ; wormseed, Levant, 4·32 to 9·7 ; xanthoxylon, 5·0. (See also *Y.B.*, **1904,** 203, 206 ; **1905,** 118 ; **1907,** 150 ; **1910,** 142.)

Atoxyl, Distinctive Reactions of. Q. Fiori. (*Boll. Chim. farm.*, 1910, **49,** 98.) Atoxyl solutions give a red colour with Ca2ClO solution and a yellow precipitate with excess. Sodium methylarsenate and cacodylate give no reaction. With $HgCl_2$ atoxyl solution gives a white precipitate, soluble in HCl and in AmOH. Sodium cacodylate gives no precipitate ; di-sodium methylarsenate a red one.

Betulin, (Betula Camphor) Micro-sublimation of. O. Tunmann. (*Apoth. Zeit.*, 1911, **26,** 344.) The bark of *Betula alba* gives better results by the method of micro-sublimation than almost any other drug. In fact, the amount of betulin may be determined by this method, employing 0·5 Gm. of powdered birch bark. It ranges in amount from 11·9 to 14·1 per cent. The microscopic characters of the aggregated needles are figured and described.

Calcium Glycerophosphate. A. Astruc. (*J. Pharm. Chim*, 1910, **1,** 490, 539, 577 ; **2,** 11.) A very complete investigation of this salt is thus summarized. Calcium monoglycerophosphate, the official salt of the French Codex, is not alone the commercial salt. Besides containing impurities most of these are mixtures of calcium mono- and di-glycerophosphate. The presence of salts other than the official one is indicated by the gravimetric determination of the Ca and of the P present calculated as P_2O_5 ; and also by the differences found between the quantity of glycerophosphate calculated from these data, from the incineration residue, and from the volumetric determination. Neither the gravimetric determination of the total P nor the weighing

of the incineration residue throw any light on the amount of the official salt contained in a commercial sample. This can, however, be determined by acidimetry. Neither treating the commercial compound with boiling alcohol, nor precipitating its aqueous solution with alcohol, afford the official salt. This may, however, be obtained by heating an aqueous solution of the commercial salt, taking care that the temperature does not exceed 70°C. Between that temperature and 100°C., and especially at the higher temperature, the precipitate is a mixture of mono- and di-glycerophosphate. The official monograph should be revised in the following directions. Pure calcium mono-glycerophosphate is neutral to phenolphthalein. The determination of the moisture at 150–160°C. should be made, and more than 1 mol. H_2O might be tolerated. Citric and oxalic acids, and ammonia, should be sought for as impurities. Incineration should be performed on a sample not previously dried. The results of the gravimetric determination of the Ca, the P, the incineration and the titration should give concordant results.

Camphor and Phenol, Freezing-point Curve for Mixtures of. J. K. Wood and J. D. Scott. (*Proc. Chem. Soc.*, 1910, **26**, 194.) The authors have determined the freezing-points of a large number of mixtures of camphor and phenol, ranging in composition from pure phenol on the one hand to pure camphor on the other. The form of the freezing-point curve indicates the formation of a compound, the freezing-point of which is 18·6°, between equimolecular proportions of camphor and phenol. The curve also shows that eutectic mixtures are produced when the molecular percentage of camphor in the mixture amounts to either 29·5 or 59·21; in the former case the eutectic mixture is composed of phenol and the compound, and in the latter case of camphor and the compound. The freezing-points of the two eutectic mixtures are respectively −30·5° and −32·0°.

Camphor Monobromide, Determination of Brin. André and Lulier. (*J. Pharm. Chim.*, 1910, 2, 64.) Half a gramme of the monobromide, dissolved in 10 c.c. of toluene, is heated for an hour under a reflux condenser, with 1 Gm. of metallic Na. Thirty c.c. of water is then added, the solution is made strongly acid with HNO_3, and 25 c.c. of N/10 $AgNO_3$ solution is run in. The excess of silver is then titrated, in the usual manner, with N/10 KCNS, with iron alum indicator. The presence of toluene does not interfere with the end reaction.

Capsaicin and Capsicum, Detection of. E. K. Nelson. (*J. Ind. and Eng. Chem.*, 1910, **2**, 419 ; *Analyst*, 1910, **35**, 518.) The following method is stated to be more sensitive than that of Garnett and Grier (*Y.B.*, **1907**, 443) for the detection of capsicum in the presence of ginger products in aerated beverages or ginger tinctures and essences. Ten c.c. of an essence or the Et_2O extract from 100 c.c. of a beverage, which, previous to shaking out, has been freed from alcohol by evaporation, is evaporated at 100°C. with 10 c.c. of alcoholic N/2 KOH. About 7 Mgm. of MnO_2 and 5 to 10 c.c. of water are added and the heating is continued for 20 minutes or until all volatile oils have been driven off. The cold liquid is acidified with dilute H_2SO_4 and then shaken out with petroleum ether. The solvent is evaporated in a small crucible and the residue is heated to 100°C. for 5 minutes. The whole of any capsaicin present will thus be obtained in the residue, to which the tip of the tongue should be applied ; the characteristic acrid taste will then be perceived. With minute quantities this may not develop for a few minutes. It is claimed that 1 of tincture of capsicum U.S.P. in 1,000 of tincture of ginger U.S.P. may be detected thus. (See also *Y.B.*, **1909**, 23.)

Cannabis indica, Indian and Greek. (*Southall's Report.*) Four samples of the true drug showed lower figures for resin than usual ; a sample of the tops of female *Cannabis sativa*, grown in Greece, was examined in comparison with this. This Grecian hemp contained much more resin than previously examined European samples.

	Indian,	Greek.
Soluble in 90 per cent. alcohol ..	10·08 to 13·92%	13·20%
Resin	6·92 to 9·92%	9·76%

(See also *Y.B.*, **1908**, 40.)

Charcoal, Willow. (*Evans' Analyt. Report*, 1910, 22.) Out of 17 samples tested only 9 complied with the official ash limit of 7·5 per cent. These varied from 2·6 to 7·5 per cent., other samples leaving up to 10 per cent. of ash. (See also *Y.B.*, **1908**, 43 ; **1910**, 143.)

Chloroform, Testing Anæsthetic. Link. (*Apoth. Zeit.*, 1910, **25**, 287, 426) ; Stadelmayr (*ibid.*, 149, 247.) It has been suggested to add Marquis's reagent to the tests to be used for anæsthetic chloroform in the forthcoming Ph.G. V. The test is to be applied by shaking 20 c.c. of the $CHCl_3$ with 15 c.c. of strong H_2SO_4 to which 4 drops of formaldehyde solution

has been previously added. No colour should be evident in half an hour. It is claimed that the detection of impurities is more rapid and more marked than when H_2SO_4 alone is used. Linke considers this to be useless, since the test with pure H_2SO_4 alone is sufficiently stringent. On the other hand, Stadelmayr supports the test; maintaining that it is at least equal to the H_2SO_4 test, for those impurities which may be detected by both; and superior to it, inasmuch as it gives colour reactions with some substances which do not react with the acid alone. He would, therefore, substitute this test, with Marquis's reagent, for the pure H_2SO_4 test. (See also *Y.B.*, **1907,** 245.)

Chocolate, Need for a Definition of. N. P. Booth. (*Proc. Seventh Int. Congr. Appl. Chem.*, London, 1909, sect. VIIIc, 178–179; *J.S.C.I.*, 1911, **30,** 235.) It is suggested that the following definitions for chocolate goods are reasonable and could be conformed to by makers of the genuine article; they are not more stringent than the standards enforced in some foreign countries. *Unsweetened chocolate* should be prepared exclusively from roasted, shelled, finely ground cacao beans and should not contain less than 45 per cent. of cacao butter. *Sweetened chocolate* should consist only of the products of roasted, shelled, finely ground cacao beans, together with not more than 65 per cent. of sugar. *Granulated* or *ground chocolate for drinking purposes* should contain the same ingredients as *sweetened chocolate*, but the proportion of sugar may be raised to not more than 75 per cent. *Chocolate-covered goods* should consist of confectionery covered with *sweetened chocolate* as defined above. *Milk chocolate* should be composed exclusively of roasted, shelled cacao beans, together with sugar, and not less than 15 per cent. of the dry solids of full-cream milk. All these products might also contain a small quantity of harmless flavouring matter. The addition of starch, fats or powdered cacao-shell to articles sold under the name of *chocolate* should not be permitted.

Corn-Meal, Detection of Foreign Seeds in. G. d'Ippolito. (*Staz. sper. agric. ital.*, 1910, **43,** 585; *Chem. Zentralb.*, 1911, **1,** 39.) When corn meal is treated with 10 per cent. HCl, it develops a yellow colour. In this any particles of the seeds of *Melampyrum arvense* show up as green specks, and those of *Lolium temulentum* or of *Lathyrus aphaca* as yellow specks. When examined under the microscope the cells of the pericarps of

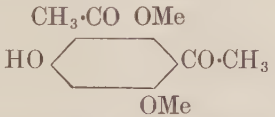
Lolium are seen to be coloured bright red, and those of the seed coats of *Lathyrus*, wine red.

Creosote from Coal Tar, Suggested Uniform Method for Testing. C. E. Sage. (*J.S.C.I.*, 1911, **30**, 588.) A scheme for the analysis of coal tar creosote is given. Special importance is attached to determining the bactericidal power by means of biological tests.

Digitalis Leaves, Powdered, Catalytic Action of, after Keeping. E. Choay. (*J. Pharm. Chim.*, 1911, **3**, 343.) Powdered digitalis, prepared from leaves dried *in vacuo* and kept in desiccator bottles for 5 months is 20 times more active on H_2O_2 than the same leaves, stove dried, and kept under like conditions. Air dried leaves, prepared from the same gathering, showed activity intermediate between these two extremes.

Eriodyctiol, Homoeriodyctiol and Hesperitin, Synthesis of a Methyl Derivative of. F. Tutin and F. W. Caton. (*Proc. Chem. Soc.*, 1910, **26**, 222.) Vanillin methyl ether, when condensed with 2 : 4 : 6-trimethoxyacetophenone, yields 2 : 4 : 6-*trimethoxyphenyl* 3 : 4-*dimethoxystyryl ketone* (m.p. 85° when air-dried, 117·5° when anhydrous), which is identical with the fully methylated product obtained from eriodictyol, homoeriodictyol, and hesperitin.

The action of aluminium chloride and acetyl chloride on phloroglucinol trimethyl ether was shown to result in the formation of a *hydroxydiacetyldimethoxybenzene* (m.p. 127–128°), possessing the following constitution :—



Eriodictyol, Homoeriodictyol and Hesperitin, Constitution of. F. Tutin. (*Proc. Chem. Soc.*, 1910, **26**, 222.) The author has methylated eriodictyol, homoeriodictyol, and hesperitin, and obtained from each of these compounds 2-hydroxy-4 : 6-dimethoxyphenyl 3 : 4-dimethoxystyryl ketone (m.p. 154°) and 2 : 4 : 6-*trimethoxyphenyl* 3 : 4-*dimethoxystyryl ketone* (m.p. 85° when air-dried, 117·5° when anhydrous), thus proving the correctness of the conclusions of Power and Tutin (*Trans.*,

Chem. Soc., 1907, xci., 887) regarding the constitution of the three naturally occurring substances mentioned.

These compounds are therefore represented as follows :—

Eriodictyol.

Homoeriodictyol.

Hesperitin.

The view was expressed that naringenin is not the phloroglucinyl ester of *p*-hydroxycinnamic acid, as concluded by Will (*Ber.*, 1887, xx., 297) but 2 : 4 : 6-*trihydroxyphenyl* 4-*hydroxystyryl ketone.*

Esterification and Hydrolysis, Direct, by Catalysis. P. Sabatier and A. Mailhe. (*Comptes rend.*, 1911, **152,** 494.) By passing the vapours of a mixture of a primary alcohol and a fatty acid other than formic acid over a column of TiO_2, heated at 280°–300°C., the corresponding ester is formed. With molecular proportions of the alcohol and acid, the following yields of esters were obtained : Isobutyl acetate, 69·5 ; methyl propionate, 72·9 ; isoamyl propionate, 72 ; ethyl butyrate, 71 ; isoamyl butyrate, 72·7 ; and ethyl isobutyrate, 71 per cent. The yield can be increased by using an excess of either constituent. Benzyl alcohol can also be readily converted into its esters by this method. Benzyl isovalerate was prepared and found to be a liquid, having a pleasant odour, b.p. 245°C. By passing a mixture of the vapour of the ester with excess of steam over the heated TiO_2 the reverse reaction, hydrolysis of the ester, is easily effected.

Ether, Anæsthetic, Chemistry of. C. Baskerville and W. A. Hamor. (*J. Indust. and Eng. Chem.*, 1911, **3,** 301,

378.) In an important and lengthy paper the authors discuss the odour tests for ether; its sp. gr. and b.p.; tests for residue, acidity, sulphur and its compounds; detection of water; the dehydration of ether; tests for alcohol and the dealcoholization of ether; different processes for making ether; detection of aldehyde; the changes occurring in stored ether; the existence of ethenol therein; the detection of peroxides; occurrence of acetal; methods of detecting aldehydes and purification of ether from these; scheme for the examination of ether for anæsthetic purposes; the purity of American anæsthetic ether; and the value of chemical tests. All these points are practically dealt with and the published literature of the subject has been exhaustively reviewed. The scheme for the analytical examination of anæsthetic ether may be thus briefly summarized. *Sp. gr.*—Determine by means of a pyknometer at 15°C. The purest commercial ether obtainable has the sp. gr. 0·718–0·719 at 15°C. This absorbs water on exposure to the atmosphere, and then reaches 0·720–721. The sp. gr. of ether for anæsthetic use should not exceed this figure unless the sole impurity is alcohol, when a sp. gr. of 0·7228, due to 3 per cent. of absolute EtOH, or even 0·724 due to 4 per cent., may be tolerated. The presence of excess of water is not permissible, since such moist ether is prone to objectionable decomposition. *B.p.*—At least 97 per cent. should distil between 34 and 36°C. under 760 mm., and none should come over above 37°C. No residue should remain at this temperature. In the case of anhydrous ether at least 99 per cent. should distil between 34-36°C., and none above 36°C. *Organic Impurities.*—When 20 c.c. of the sample is added drop by drop to 20 c.c. of pure H_2SO_4, and shaken after each addition, the mixture being kept cool during the process in a glass-stoppered bottle previously rinsed with strong H_2SO_4, the resulting solution should be colourless. *Odour.*—When 50 c.c. is evaporated spontaneously on filter paper 10 cm. in diameter, contained in a flat porcelain dish, the paper should afterwards be odourless. If there be any odour, the ether should be rejected. *Residue.*—When 25 c.c. is evaporated spontaneously in a clean glass dish, the moist residue must possess no odour, and must neither redden nor bleach blue litmus paper. It must evaporate completely on the water-bath. One hundred c.c. of the ether is allowed to evaporate spontaneously to about 15 c.c. It must be colourless and free from foreign odour. When 5 c.c. of it is allowed to evaporate at the room temperature after adding 2 c.c of

water it should neither redden nor bleach sensitive blue litmus paper. When another 5 c.c. is allowed to evaporate on filter paper no anyl compounds, pungency, or empyreumatic matter should be detectable by odour. The remaining 5 c.c. should give no colour by the H_2SO_4 test described above. *Acidity.*—When 25 c.c. of the sample and 5 c.c. of water are allowed to evaporate at the room temperature, the residue should not affect sensitive blue litmus paper. When 20 c.c. is shaken with 10 c.c. distilled water and 2 drops of phenolphthalein indicator, the same depth of colour should result on adding an equal volume of N/100 KOH solution, as is produced in a blank experiment, with a blank test, with distilled water alone. *Water and alcohol* (this test is superfluous if the ether has the correct sp. gr.).—A trace of powdered fuchsine previously dried at 100°C. in a dry tube should give no colour when shaken with 10 c.c. of the ether. When several Mgm. of anthraquinone and the same quantity of Na amalgam are added to 10 c.c. of the ether, no red or green colour should be evident. *Water.*—On shaking 1 Gm. of anhydrous $CuSO_4$ with 20 c.c. of the sample no blue colour should appear. *Water and aldehyde.*—When 15 c.c. of the ether, in a perfectly dry test tube, is treated with a small piece of metallic Na, only a slight evolution of gas should occur. The Na after standing for 6 hours should not show a white or yellow coating, and the ether should not be coloured or turbid. The ether will only withstand this test when it has been treated previously with Na. *Acetaldehyde.*—The ether should not give any colour with the reagent of François (fuchsine decolorized with SO_2.) In the case of anhydrous ether the colour should not be more than faint. On covering 5 Gm. of solid KOH with 30 c.c. of the ether, and allowing the mixture to stand for 6 hours, tightly closed, in the dark, with occasional shaking, the KOH should show no yellowish colour, and the ether should not become turbid or coloured. Pure anhydrous ether should give no reaction after 24 hours. In the absence of alcohol, as indicated by the tests for water and alcohol, aldehyde may be detected thus :—Ten c.c. of the sample is shaken with 2 c.c. of Nessler's reagent. No yellow or black colour should be evident. Pure ether is indifferent to the test ; but it is impossible to purchase ether which does not show a yellow colour. For anæsthetic ether, therefore, a yellow opalescence may be permitted, but no black colour should be tolerated. *Alcohol* may be detected, after trying the sample, by the fuchsine and anthraquinone tests

as above, and in the absence of acetaldehyde, by Lieben's iodoform test. If acetaldehyde is present, the amount is approximately determined by François' method. Then 25 c.c. is shaken out with 25 c.c. of distilled water in a graduated vessel. After separation, the aqueous layer will show an increase of volume greater than 2·5 c.c. depending on the amount of EtOH present. The aqueous layer is separated, freed from dissolved ether by warming at 40° C., then oxidizing with $K_2Cr_2O_7$ and H_2SO_4. The aldehyde produced is distilled off, and the amount present in the distillate determined colorimetrically. From these data, the amount of alcohol present may be approximated. *Peroxides.* —When 2 c.c. of a 1 : 10 solution of cadmium potassium iodide is shaken with 10 c.c. of the sample, no liberation of I should occur within an hour, as indicated by starch solution or by the appearance of a yellow tint. The presence of peroxides may be confirmed by other tests described by the authors, or by Joussen's vanadic acid test.

From the above summary it will be gathered that the subject is treated of very fully. For further details the original article should be consulted.

Ethyl Butyrate, Commercial. (*Evans' Analyt. Notes*, **1910,** 30.) The quality of commercial butyric ether is very variable. One sample examined contained 18 per cent. of water, 50 per cent. of alcohol, 7 per cent. of ethyl acetate and only 25 per cent. of ethyl butyrate. Another specimen contained acetic ether in the lower boiling fractions.

Formaldehyde, Simple Method of Determining. F. Herrmann. (*Chem. Zeit.*, 1911, **35,** 25.) About 4 Gm. of commercial formaldehyde solution is weighed off and mixed in a stoppered bottle of 150 to 200 c.c. capacity with 3 Gm. of finely-powdered AmCl and then with 25 c.c. of N/2 NaOH solution added from a burette as rapidly as possible, and the bottle is closed and allowed to stand. As soon as its contents have cooled to the ordinary temperature, 50 c.c. of water and 4 drops of a 1 per cent. solution of methyl orange are introduced, and the liquid titrated with N/H_2SO_4, to obtain the number of c.c. of N/1 alkali solution consumed in the formation of the hexamethylenetetramine. The result multiplied by 0·06 gives the quantity of formaldehyde in the formalin solution. The nascent AmOH thus formed gives more accurate results than the addition of AmOH solution to the solution of formaldehyde as

in Legler's original method. (See also *Y.B.*, **1904,** 90; **1906,** 34; **1908,** 81; **1910,** 154.)

Formaldehyde Solution, Simple Method for the Valuation of. W. Braeutigam. (*Pharm. Zentralh.*, 1910, **51,** 916.) The method is based on the reactions which take place between $CaOCl_2$ and CH_2O, resulting in the ultimate formation of $CaCO_3$, one mol. of which is equivalent to one mol. of CH_2O as expressed in the following equations—

$$CH_2O + CaOCl_2 = HCO_2H + CaCl_2.$$
$$HCO_2H + CaOCl_2 = CO_2 + H_2O + CaCl_2.$$
$$2CaOCl_2 + CO_2 + H_2O = CaCO_3 + CaCl_2 + 2HClO.$$

About 300 c.c. of freshly prepared chlorinated lime solution is treated with 10 Gm. of a 1 : 10 dilution of the formaldehyde solution to be tested, and set aside in a loosely-stoppered flask; at normal temperatures and under the influence of daylight, reaction speedily takes place, as indicated by the appearance of precipitate. When this is complete the supernatant liquid will be clear. The $CaCO_3$ is then collected on a tared filter, and the filtrate is heated to boiling to ensure completion of the reaction. Should any further precipitate be formed, this should be added to that first collected. The whole is then washed free from chlorides, dried at 100°, and weighed. Each 1 Gm. of $CaCO_3$ is equivalent to 0·3 Gm. of CH_2O. Good commercial formaldehyde solutions were found to give from 1·15 to 1·2 Gm. of $CaCO_3$, equivalent to 35 to 36 per cent. of formaldehyde, when treated by this method.

Fruit, Chemical Changes in. H. P. Bassett and F. Thompson. (*J. Amer. Chem. Soc.*, 1911, **33,** 416.) After being picked, and very rapidly after being bruised or damaged, a tannin-like substance appears in fruit. This is not present in the sound fruit while on the tree. It seems to be formed as a protective agent against fungoid and bacterial growths. It acts thus partly by rendering insoluble the proteins present and partly by its own specific antiseptic action. This tannin is formed by the action of a ferment, almost universally present in soft fruits, which is only active in slightly acid solutions the acidity of which is above a certain minimum. Fruits also contain another ferment, apparently a catalase actively liberating O from H_2O_2.

Glycerin, Sp. gr. and Co-efficient of Expansion of. — Comey and Backus. (*Chem. Rev. Fett. Harz.*, 1910, 108; *Pharm.*

Zentralh., 1910, **51,** 876.) The sp. gr. of pure glycerol has the following mean values : At 15·5°C. 1·26101 ; at 20°C., 1·25664 ; at 25°C., 1·25354 ; at 30°C. 1·25040. The co-efficients of expansion are : At 20°C., 0·000616 ; at 25°C., 0·000619 ; at 30°C., 0·000623.

Guaiacol Carbonate and "Creosote Carbonate," Approximate Valuation of. A. Fernau. (*Apoth. Zeith.*, 1911, **26,** 322.) Ten Gm. of the carbonate is warmed on the water-bath with 30 Gm. of alcoholic KOH. After evaporation to about 15 Gm., the residue is treated with a slight excess of HCl. The creosote or guaiacol separates as an oily layer. The whole is transferred to a graduated 100 c. c. cylinder, by means of about 60 c.c. of water. Five or 10 Gm. of NaCl is added, and the oily layer is allowed to separate. The volume is then read off. Separation may be hastened by immersing the cylinder in warm water.

Guarana, Guaranatin-Caffeine in. A. Goris and G. Fluteaux. (*Bull. Sci. pharm.*, 1910, **17,** 599.) In the course of a general investigation of the caffeine-containing plants, the authors find that the caffeine in Guarana exists as a definite compound, which they have isolated and named guaranatin-caffeine. It resembles the compound kolatin-caffeine found by them in kola nuts (*Y.B.*, **1907,** 88). It is prepared in a similar manner, using, however, a large volume of alcohol 80 per cent., instead of $CHCl_3$, and evaporating off the solvent in a current of H. The guaranatin-caffeine thus obtained yields only traces of free caffeine to $CHCl_3$, but when treated with hot water it is split up into caffeine and guaranatin ; the latter crystallizes out from the aqueous solutions. It is probably identical with Scheer's paullinia-catechin. Cocoa does not contain any body resembling kolatin or guaranatin.

Hexamethylene-tetramine, Compounds with Metallic Salts. G. A. Barbieri and F. Calzolari. (*Atti. R. Acad. Lincei*, 1911, **20** [1], 119 ; *Chem. Zentralb.*, 1911, **1,** 1131.) On mixing strong aqueous solutions of certain salts with concentrated aqueous solutions of hexamethylene-tetramine, definite crystalline compounds are formed. Such are $Mg(SCN)_2,10H_2O$, $2C_6H_{12}N_4$, in long colourless, holosymmetric trictinic crystals ; $Mn(SCN)_2$, $4H_2O$, $2C_6H_{12}N_4$ $Fe(SCN)_2$, $4H_2O$, $2C_6H_{12}N_4$, and similar compounds of Co and Ni. Also $Mg(NO_3)_2$, $10H_2O$, $2C_6H_{12}N_4$, and similar compounds of Mn, Co, and Ni. With the

perchlorates $Mg(ClO_4)_2, 8H_2O$, $2C_6H_{12}N_4$ and similar salts of Mn, Co, and Ni also. All these form very characteristic crystals.

Indole in Flowers, Method of Detecting. J. Sack. (*Apoth. Zeit.*, 1911, **26,** 302; *Pharm. Weekblad*, 1911 [13]. The freshly plucked flowers are placed in a suitable glass vessel fitted with a cover. To the latter, strips of filter paper are attached, moistened in a solution of vanillin in equal parts of EtOH and strong HCl, or of para-dimethylamidobenzaldehyde in the same solvent. The latter affords a very sensitive reagent for indole giving a violet to reddish colour. In this manner indole was detected in the odorous emanation of *Citrus auruntium*, *C. decamona*, *C. japonica*, *C. limonum*, *C. nobilis* and *C. trifoliata*. The flowers on the tree were also tested by inserting them in a flask, the bottom of which was covered with cotton wool moistened with the above reagents. The neck was then plugged with wool and the whole left in position. Another reaction was obtained by placing a layer of cotton wool, soaked in saturated solution of oxalic acid, on the bottom of a covered glass vessel. On this was laid a clock glass carrying the flowers. In 24 hours, in the presence of indole, a violet red colour appears on the wool. In the case of the *Citrus* species examined this only occurs in the light. If the flowers are kept in the dark they give no reaction. It is to be noted that skatole gives the same reaction as indole with the vanillin and para-dimethylamidobenzaldehyde test, but does not react with oxalic acid. (See also *Y.B.*, **1907,** 82, 168; **1908,** 96; **1910,** 165.)

Insect Powder, English and Japanese. (*Southall's Report*, **19,** 10.) Samples taken from authentic batches ground have given, when tested by Durrant's method, from 7·57 to 8·28 per cent. of oleoresin.

A specimen of Japanese insect flowers, assayed in the same way, yielded 13·98 per cent. of oleo-resin of an orange-brown colour. The greater number of the flowers were open.

Insect Powder, Valuation of. (*Evans' Analyt. Notes*, **1910,** 36.) Low-grade insect powder is met with on the American market containing 3·0 to 4·8 per cent. of ether-soluble resin, the green colour of the extract indicating admixture of open flowers and stem tissues. Powder ground in England from unopened flowers has yielded 7 to 9 per cent. of ether-soluble resin, the extract being yellowish-green.

Iodoform, Determination of, and Valuation of Iodoform Gauze. A. H. Clark. (*Amer. J. Pharm.*, 1910, **82**, 451.) The following method for the assay of CHI_3 is said to give good results: The iodoform is added to 50 c.c. of N/10 $AgNO_3$, to which has been added 3 c.c. HNO_3, U.S.P., 50 c.c. EtOH is added, the whole being contained in a 250 c.c. flask and gently boiled on the water-bath under a reflux condenser for half an hour. After cooling water is added to make about 150 c.c., a little ferric ammonium sulphate, T.S., added, and the excess N/10 $AgNO_3$ solution determined with N/10 KCNS solution. Each 0·1 c.c. of N/10 $AgNO_3$ used up = 0·0130 Gm. iodoform.

In the case of gauze, a weighed quantity is extracted in a Soxhlet attached to a 250 c.c. flask, containing the N/10 $AgNO_3$ and the HNO_3. EtOH is then poured through the condenser on to the gauze in the extraction tube until it siphons into the flask, and extraction is continued for 1 hour, when the flask is disconnected and, after cooling, the titration made as described above. (See also *Y.B.*, **1905,** 97, 229, 262; **1910,** 156.)

Iodoform, Dimorphism of. B. Barlach. (*Chem. Zentralblatt.*, 1911, **1**, 541.) When acetone solutions containing an anhydride are treated with KI and I reagent, yellow needles are formed which prove to be CHI_3, m.p. 121°C. The same are obtained by treating a solution of coumarin in 3 per cent. alcohol with KI and I reagent, and AmOH, then dropping in a 2 per cent. CHI_3 solution. On recrystallizing these needles from alcohol and on distillation the CHI_3 assumes its normal form of hexagonal plates.

Licorice, and Licorice Extract, Determination of Glycyrrhizin and Sugars in. E. Eriksson. (*Arch. Pharm.*, 1911, **249**, 144.) The method is based on the fact that glycyrrhizin, on hydrolysis, yields two molecules of glucuronic acid, $CHO(CH{\cdot}OH)_4COOH$, an aldehyde-acid which reduces Fehling's solution. Ten Gm. of the licorice extract are coarsely powdered and treated with 100 c.c. of cold water. One hundred c.c. of 90 per cent. alcohol are mixed well with the resulting solution, and after heating for 30 minutes on the water-bath, the solution is filtered and the filter washed with 50 c.c. of hot alcohol. The filtrate is heated on the water-bath until free from alcohol, filtered, and made up to 200 c.c. To 40 c.c. of the solution, 25 per cent. H_2SO_4 is added so long as a precipitate is produced, and after allowing to stand for 2–3 hours, the glycyrrhizin is filtered off

and washed with 5 per cent. H_2SO_4. The filter with the glycyrrhizin is heated with 50 c.c. of 90 per cent. alcohol, filtered, and 30 c.c. of water added to the filtrate. After expelling the alcohol, the glycyrrhizin is reprecipitated with H_2SO_4, then dissolved in a 5 per cent. solution of alkali and after diluting with water, boiled for 15 hours with 120 c.c. of Fehling's solution, and from the cupric-reducing power the percentage of glycyrrhizin is calculated (360 parts of dextrose are equivalent to 896 parts of glycyrrhizin). In the filtrate from the first precipitation of glycyrrhizin, the reducing sugars (dextrose) and hexoses (sucrose) are determined with Fehling's solution after neutralizing with 5 per cent. alkali, the former by allowing to stand overnight with Fehling's solution at the ordinary temperature, and the latter by boiling the filtrate from the cuprous oxide with a further quantity of Fehling's solution for 3 minutes. For licorice root, essentially the same method is used, except that the order of the separate determinations is different. The powdered root is extracted with alkaline water, and after precipitating gummy substances with alcohol, the reducing sugars are determined with cold Fehling's solution; in the filtrate from the cuprous oxide, the hexoses are determined by boiling for 3 minutes with Fehling's solution; and finally after again filtering off the Cu_2O the glycyrrhizin is determined by boiling for 15 hours with Fehling's solution.

The following results have been obtained in the examination of powdered licorice root, and "juice" of well-known brands.

	Glucose.	Saccharose.	Glycyrrhizin.
Italian roots	1·39-1·43	2·4-2·57	6·65-7·10
Spanish Tortosa roots	1·28	3·20	6·49
Russian roots	—	6·48	2·20
„ „	Traces	6·50	8·15
„ „	3·80	6·25	2·33
Fresh Atri roots	—	2·6	6·72
Cassano juice	6·30	11·80	16·45
B. Compagna juice	3·29	4·52	14·22
S. Franca „	2·20	8·17	23·90
Corrigliano „	2·82	9·06	12·10
Barraco „	5·20	11·90	11·59
Atri	5·90	12·48	10·2
Extract prepared by author from Atri root	4·5	13·6	9·85

Licorice Juice. (*Chem. and Drugg.*, **1911, 78,** 403.) The trade in adulterated licorice juice is notoriously on the increase. Certain Continental countries which do not grow the root, import inferior bitter licorice pastes, add large quantities of foreign matter, mould the product into sticks, brand these with an Italian or Spanish name, and export them to this country. Parry has already directed attention to this, and has devised a method for the systematic examination of the product. Eriksson has also investigated the subject (*vide supra*). The adulterant is stated to be a special form of invert sugar which is readily to be detected. (See also *Y.B.*, **1906,** 46.)

Licorice Juice, Analysis of. F. Telle. (*Annales des Falsifications*, 1911, **4,** 3.) *Moisture.*—Dry 5 Gm. to constant weight at 100–105°C. *Soluble and insoluble constituents in AmOH.*—Centrifugate 2·5 Gm. with 20 c.c. of water for 15 minutes; decant the clear liquor; again centrifugate the residue with 10 c.c. of a mixture of AmOH solution, sp. gr. 0·9241, with water, 9; filter off and wash the insoluble matter twice with 10 c.c. of water. Bulk the clear liquids and evaporate to dryness, weighing the dry extract as soluble extractive. Dry the insoluble residue, weigh, and examine microscopically. *Insoluble ash.*—Ash the above residue and weigh. *Insoluble matter in alcohol 70 per cent.*—Dissolve a portion of the above ammonia soluble extractive in 10 c.c. of water, add 25 c.c. of alcohol 95 per cent., mix well and centrifugate, separate the precipitate, dry, and weigh as gum and mucilaginous matter. *Nitrogen.*—Determine the total N by Kjeldahl's method. *Glycyrrhizin.*—The alcoholic solution, after separating the gum and mucilage, is made up to 50 c.c.; then add 1 c.c. of HCl. Glycyrrhizinic acid separates as a slimy mass. Allow to stand for 24 hours and decant the clear liquid. Wash the residue first with 50 c.c. of Et_2O, saturated water; add 1 c.c. of AmOH, filter the solution, wash the insoluble residue with dilute AmOH, evaporate the bulked AmOH solution to dryness and weigh. *Sugar.*—Weigh off 5 Gm. of the juice, dissolve it in water; add 10 c.c. of basic lead acetate and make the volume up to 100 c.c.; filter, decolourize with animal charcoal and polarize in saccharometer. *Gum.*—Dissolve 1 Gm. of the juice in 10 c.c. of water, add 1 c.c. of 10 per cent. $CuSO_4$ solution, and filter. To filtrate add half its volume of aqueous solution of soap, and shake. In presence of 1 per cent. of gum a gelatinous precipitate will be obtained. Table is given showing

the results of the analysis of 17 different samples of licorice juice.

Licorice Juice, Analysis of. E. J. Parry. (*Chem. and Drugg.*). Since the author first directed attention to the subject (*Chem. and Drugg.*, 1910, **77,** 21), two important contributions to the subject have appeared, one by E. Eriksson, the other by Telle (*supra*). The subject has recently assumed considerable interest on account of the enormous extent to which adulteration of licorice-juice is practised. As a consequence, steps have already been taken in France to establish standards of purity, resulting in the manufacture of pure juice in that country. *Glycyrrhizin.*—Hafner (*Y.B.*, **1900,** 194) fixed the minimum permissible as 7 per cent. on the dry juice. As previously pointed out by the author, this figure differs enormously according to the place of origin of the licorice-juice, and in the case of ordinary Italian juices, 9 to 13 per cent. will cover nearly every pure sample. As most other juices are not edible without the addition of some foreign matter, the glycyrrhizin value may be normal in highly adulterated Anatolian juices, but other values will indicate dilution. Telle's figures for juices made in the laboratory show no value below 13 per cent. on the dry juice. Eriksson, using two different processes, gives the following values for glycyrrhizin: 9·85-16·45 and 9·3-14·28 (except one value of 23·9, which is obviously an Anatolian juice). Leaving out of account Spanish juices which have too little "body" to be used alone, all the author's results point conclusively to a minimum of 9 per cent. for normally prepared edible juices. *Sugars.*—Hafner paid no attention to the question of sugar in licorice-juice as indicative of adulteration. The author laid considerable stress on this determination and Eriksson and Telle amply confirm this view. Erkisson agrees that the author's methods give very concordant results, but proposes a different process giving much lower results. He removes the glycyrrhizin and then determines the "reducing" sugars by allowing the solution to stand in contact with Fehling's solution in the cold for 16 hours. The saccharoses are determined by merely boiling the filtrate with excess of Fehling's solution for 3 minutes. Since complete reduction will not take place in the cold, nor will 3 minutes' boiling with Fehling's solution ensure complete inversion of the saccharoses, this method is open to criticism. The consequence is that Eriksson finds less invert sugar and more saccharin present in pure juices than the author has done, but no material difference in the total sugars. The

percentage values for sugars given in the author's original paper were—

	Calabrian.	Anatolian.	Spanish.
Before inversion .	11·90–13·50	10·88–12·00	12·50–14·50
After inversion .	14·50–15·50	12·90–13·90	14·45–15·25

Eriksson finds *total* values of 8·3 to 18·3 per cent., while Telle obtained in one juice as much as 29 per cent., a figure which cannot be regarded as correct, especially as every other figure of importance recorded for the juice is quite abnormal. The above results warrant the statement that a normal edible juice contains not more than a total of 18 per cent. of sugars. An Anatolian juice, containing 20 per cent. or more of glycyrrhizin, if reduced to the 9–13 per cent. standard of edible Calabrian juices, will show very high values for sugar, starch, gelatin, gum, or similar substances. *Starch and gums.*—Eriksson's work is practically confined to the question of glycyrrhizin and sugar values, but Telle has gone into several other questions. The presence of starch is very important. Some of the purest brands contain starch which, owing to the crude method of filtration, finds its way from the root into the juice which is to be evaporated. In order to determine whether this starch is natural or added, the sample should be powdered, extracted with water, and the residue taken up with 3 per cent. AmOH solution. The insoluble matter, which should never exceed 6 per cent., should be examined under the microscope to determine the characters of the starch in comparison with that present in licorice-root. Telle has shown that the amount of matter not dissolved in 70 per cent. alcohol is an important feature, which the author confirms. Telle's mode of expression is, however, unfortunate, for he really means the amount precipitated from an aqueous extract of the juice when sufficient alcohol is added to make the solution to contain 70 per cent. of alcohol. In pure juices Telle finds this value does not exceed 16·5 per cent. (except in some doubtful Levant and Spanish juices), whereas the presence of gum, gelatin, and commercial glucose containing dextrin increases this value considerably. Gum is said by Telle never to be present in pure licorice juice.

A consideration of these results shows that the following determinations will yield very useful results in the analysis of the juice : Moisture, mineral matter, glycyrrhizin, invert sugars, uninverted sugars, matter insoluble in water, matter insoluble

in dilute ammonia, alcohol precipitate, and microscopic examination of the matter insoluble in water and ammonia. These will enable an analyst to express a definite opinion as to the purity of a given sample, especially if due regard be paid to the place of origin of the juice.

Licorice, Stick and Block Juice, Glycyrrhizin Determination of in. (*Evans' Analyt. Notes*, **1910**, 45.) The following modification of Parry's method gives good results. 2·5 Gm. of well ground juice is dissolved in 15 c.c. of water, with heat. Cool and add gradually with stirring 23 c.c. of industrial spirit with 2 c.c. of water, and 50 c.c. of industrial spirit. Set aside to settle about 30 minutes, filter through a tared paper into an evaporating dish, washing dish and paper with 50 c.c. industrial spirit mixed with 4 c.c. of water. This leaves the insoluble starch and gum on the paper, which is dried and weighed. Bulk the alcoholic filtrates, evaporate on a water-bath to a syrup. Transfer to a cylinder with the aid of 30 c.c. of water, cool strongly in a melting ice bath, and add 3 c.c. H_2SO_4 (1–30) with constant agitation, then freeze solid in an ice-salt jacket. If gradually melted the glycyrrhizin forms a compact mass at the bottom of the cylinder. Wash by decantation with about 50 c.c. of H_2O at 0°C., drain as far as possible, add 2 c.c. ammonia water, and transfer to a tared dish with absolute alcohol; evaporate and dry at 100°C. until constant.

Block juice examined by this method contained from 25 to 28 per cent. of starch and gum, and from 19 to 22 per cent. of glycyrrhizin. Well-known brands of stick licorice contained from 38·2 to 45·6 per cent. of starch and gum, and from 6·6 to 13 per cent. of glycyrrhizin.

Liquor Cresol saponatus, Valuation of. H. Serger. (*Apoth. Zeit.*, 1911, **26**, 369.) *Determination of fatty acids.*—Twenty Gm. of the sample is twice diluted and evaporated to dryness with 500 c.c. of water in a capacious dish. This removes the cresol. The soapy residue is dissolved in about 40 c.c. of water and transferred to a graduated glass cylinder. HCl, sp. gr. 1·19, 10 c.c., and saturated NaCl solution, 10 c.c., are added. After thorough mixing exactly 20 c.c. of petroleum ether is added and the whole is again shaken up. On the separation of the liquids, the volume of the petroleum ether layer is read off. The increase observed is taken to be the volume of the fatty acids; this figure × 0·92 gives the weight.

Determination of cresol.—Twenty Gm. of the solution is treated with 20 c.c. of water, then transferred to a graduated cylinder, as above, and treated with acid and petroleum ether. The increased volume of the last named, less than for the fatty acids previously found, gives the volume of the cresol. This figure $\times 1{\cdot}04$ gives the approximate weight.

Determination of hydrocarbons.—Twenty Gm. of the cresol solution is introduced into a 200 c.c. cylinder treated with 75 c.c. of a 8 per cent. KOH solution and shaken. Then 75 c.c. of a mixture of equal parts of ether and petroleum ether are added, and moved for some time up and down, but without hard shaking, to avoid forming an inseparable emulsion. An aliquot part of the ether-petroleum-ether solution is then transferred to a tared beaker, and the residue obtained on evaporating the solvent, dried at 100°C., and weighed. The small amount of hydrocarbons generally present is not sufficient to materially affect the volumetric determination of fatty acids and cresol by the methods given above. If necessary, the requisite correction for the volume of hydrocarbons present in these solutions can be made from the results obtained.

Melting-point Determinations, Suggestions for. G. A. Menge. (*Bull. of U.S. Hygienic Lab. of Health and Marine Hosp.; Pharm. J.*, 1911, **32**, 238.) Among other suggestions for the determination of pharmacopœial melting-points, it is stated that, instead of a single figure, a range of temperature within which a substance must melt completely should be given, the beginning and end of the melting being clearly defined.

The decomposition point should be clearly differentiated from the melting-point, and its determination should not be required as an official test of purity.

Details of manipulation should be clearly described, and uniformity of practice therein rigidly required. Constant stirring of the melting-point bath during an official test, and a uniform rate of heating of 3°C. per minute from 25°C. below the melting-point to the beginning of melting, and of 0·5°C. per minute during the melting interval, is recommended.

As a preliminary to the official test, the compound must be so finely powdered as to pass through a 100-mesh sieve; and the powdered substance must be dried for 24 hours in a desiccator over strong H_2SO_4. A sample of the powdered and dried substance for an official test should be sufficient to form a solid

column (tapped down), 3 mm. high in the bottom of a thin-walled capillary tube, the internal diameter of which is not less than 0·8 mm. nor more than 1·25 mm.

Methyl Alcohol and Acetone, Detection of, in Tincture of Iodine. G. Denigès. (*Nouveaux Remèdes*, 1910, **27,** 306.) Ten c.c. of the tincture is placed in a large test-tube and decolourized by adding, drop by drop, saturated solution of thiosulphate. The test-tube is then attached by means of a rubber cork, to a simple condensing tube with a diameter of at least 7 or 8 mm. and ascending quite 50 cm. before it is sharply bent. This forms a dephlegmator, and allows a more perfect fractional distillation of the alcohol. The alcohol is then gently boiled until 2 c.c. of distillate has been collected in another tube. To 1 c.c. of this is added 5 c.c. of 1 : 100 solution of $KMnO_4$ and 2 c.c. of pure H_2SO_4. After mixing, the tube is set aside for 2 or 3 minutes, then 1 c.c. of cold saturated solution of oxalic acid is added, and when the colour has become pale Madeira, 1 c.c. more H_2SO_4 when decolouration becomes complete. To this colourless solution 5 c.c. of fuchsine bisulphite is added. If much methyl alcohol be present a magenta colour will appear in a few minutes ; in a quarter of an hour, if only small quantities are present, and if but traces the colour will be bluish. *Detection of acetone.*—To the other c.c. of original distillate add 1 c.c. of water, 2 drops of sodium nitroprusside solution, 5 per cent., and 2 drops of NaOH solution, sp. gr. 1·332. After agitation a slight excess of acetic acid is added. A reddish purple colour appears with much acetone, and a pinkish tint if only a little be present. By these tests 1 per cent. of French denatured alcohol may be readily detected in tincture of iodine.

Musk, Synthetic, Variation of. (*Evans' Analyt. Notes*, **1910,** 49.) Commercial artificial musk shows a great variation in composition and purity. The 100 per cent. xylol musks (trinitro tertiary butyl xylene) have had m.p. 105·5° to 114°C., the highest figure representing the sample of greatest purity ; owing to a partial softening prior to melting, the first moment of compete fusion is the temperature taken. One other important criterion of purity, especially to soapmakers, is the faculty of standing the action of warm alcoholic potash without producing a colour, slightly impure specimens give a violet-black colour at once.

One artificial musk said to be nitrated methyl ether of butyl meta-cresol had a m.p. 84·5°, but possessed no strength. Some

samples of 10 per cent. musk offered, contained as little as 6·2 per cent. of pure artificial musk, diluted with acetanilide and other substances.

Nitrogen Determination by Kjeldahl's Methods. E. F. Harrison and P. A. W. Self. (*Pharm. J.*, 1910, **31,** 4.) The fact is shown that the splash traps ordinarily used in the distillation process may not be inefficient in preventing the carrying over of alkaline spray into the distillate. This may be specially the case during the latter portion of the distillation, when the alkaline residue becomes more and more concentrated. The degree of alkalinity of the distillate is shown in a blank experiment to rise during each 15 minutes of boiling that of the last of 10 such periods being equivalent to 1 c.c. of N/10 acid. It is recommended, therefore, that a blank experiment with the same apparatus, under similar conditions, should be made, and the necessary correcting factor thus obtained. On evaporating the titrated distillate to dryness, Na_2SO_4 may be found in the residue.

Organic Matter, Destruction of, by Means of Nitrous Vapour. P. Breteau. (*J. Pharm. Chim.*, 1911, **3,** 430.) The following method is rapid, convenient and cleanly ; it is specially useful for the destruction of organic matter in toxicological examination for mineral poisons. About 300 Gm. of the material, such as an organ, is a convenient quantity to use. This is placed in a capacious flask, with 300 c.c. of pure H_2SO_4 ; and about 0·2 Gm. of $CuSO_4$ or $MnSO_4$ may advantageously be added. The flask is inclined over a low ring bunsen burner, and fitted with two tubes, one to lead the nitrous fumes through the acid, the other leading to an aspirator or water pump. The nitrous fumes may be most conveniently obtained by passing SO_2, derived from a syphon of liquid SO_2, into 500 c.c. of HNO_3 in a Durand's wash bottle. This is connected up with the flask containing the H_2SO_4 and organic matter. The flow of SO_2 may be regulated by a fine thread pinch cock ; the NO vapour is then aspirated through the acid liquid carefully and gently heated on the bunsen. All organic and carbonaceous matter quickly disappears. The arrangement of the apparatus is figured.

Papain, Proteolytic Action of. (*Evans' Analyt. Report*, **1910,** 54.) Three samples examined gave the following results when digested for 6 hours at 40°C.

No.	Weight of Papain.	Weight of Dry Blood Fibrin dissolved.	Medium.
1	1	3·7	Alkaline
2	1	3·8	,,
3	1	9·0	,,
	1	4·0	Acid

This last sample also dissolved sixteen times its own weight of insoluble muscle protein in 6 hours at 40°, in an alkaline medium. Lean beefsteak is used in the latter determination, 10 Gm. (minced) being macerated with 0·1 Gm. of the enzyme, 25 c.c. of water and 0·5 Gm. of sodium bicarbonate. Since the juices of the meat are soluble in water to the extent of 75–80 per cent. of the weight used, it is necessary to do a control experiment to obtain the amount of dry insoluble residue left by 10 Gm. of meat, independent of the papain. At the end of 6 hours the digesting flasks are plunged into boiling water to destroy the enzyme, and the undissolved meat is transferred to an asbestos packed Gooch crucible, filtered and washed with a definite volume of water, and dried at 105°C. until constant. Papain, unlike pepsin, is more active in faintly alkaline media.

Passifloræ, Hydrocyanic Acid in the Unripe Fruit of. J. Sack. (*Pharm. Weekblad.*, 1911 [13]; *Apoth. Zeit.*, 1911, **26**, 302.) HCN is found in the unripe seeds and pericarps of *Passiflora fetida*, *P. laurifolia* and *P. quadrangularis*. Acetone is also present. Neither are found in the ripe fruit.

Pepper, Iodine Value of. C. Arragon. (*Ann. Falsific.*, 1911, **4**, 103–104.) A determination of the iodine value of a sample of ground pepper affords evidence of the genuineness of the sample. Two Gm. of the finely-powdered pepper is treated in a stoppered flask with 15 c.c. of $CHCl_3$ and 25 c.c. of Hübl's reagent. After the lapse of 4 hours, the excess of I is titrated with thiosulphate solution in the usual way, but during the titration the contents of the flask must be shaken thoroughly, as the powder persistently retains free I. Thirty samples of pepper examined yielded iodine values varying from 16·1 to 18·0, whilst four other samples, each containing 60 per cent. of rice starch, showed an iodine value of 7·5.

Petrol Used in Motors, Determination of C_6H_6 in. G. Halphen. (*Les Matières Grasses*, 1910, **3**, 1987; *J.S.C.I.*, 1910,

29, 1447.) Numerous products have recently been put upon the market as substitutes for petrol for motor cars, and are largely used owing to their lower price. They consist of mixtures in varying proportions of C_6H_6 with petroleum spirit, or of pure C_6H_6. The sp. gr. of these mixtures, 0·750 to 0·760, affords an indication of the presence of C_6H_6, sp. gr. 0·880. The types of petroleum spirit supplied to motorists have approximately the following characteristics :—

	Roumanian.	Austrian.	Americam.
Sp. gr. at 15°C.	0·725	0·730	0·7023
Per cent. distilling below 75°C.	17·0	9·5	33·5
Per cent. distilling from 75° to 125°C.	74·0	87·0	58·0
Per cent. distilling above 125°C.	9·0	3·5	8·5

Other petroleum spirits with a higher sp. gr. (about 0·735) are also frequently met with. The presence of 5 to 10 per cent. of C_6H_6 in such petroleum spirits might be detected by the fact that asphaltum is soluble in C_6H_6, but not in petroleum spirit. In the author's method of separation the C_6H_6 hydrocarbons are converted into mononitro-derivatives, which are then absorbed by H_2SO_4, and the amount of C_6H_6 is calculated from the increase in volume of the acid. In preliminary experiments it was found that pure petroleum spirit gave apparent yields of C_6H_6 in the following proportions :—American petrol, 0·87 ; Roumanian, 1·74 to 3·48 ; and Russian, 3·04 per cent. It was therefore necessary to subject the samples to a preliminary shaking with an equal volume of H_2SO_4, so as to remove, before the nitration, the bulk of the hydrocarbons capable of absorption by the acid. Ten c.c. of the petroleum spirit thus purified is placed in a flask closed with a stopper pierced with two holes, through one of which passes the stem of a stoppered funnel containing 10 c.c. of fuming HNO_3, while a long tube passes through the other. The acid is added 4 or 5 drops at a time, the flask being meanwhile continually shaken and cooled in water, and the shaking is subsequently continued for 5 to 7 minutes. After the nitration is complete, 10 c.c. of water are introduced, little by little, through the funnel, while the flask is still kept cool, and then 40 c.c. of water, which may be added in one volume, and the flask is well shaken and cooled, so that the nitrous vapours are absorbed. The products of the nitration are then transferred

to a separating funnel, the flask being rinsed out with 10 c.c. of the purified petroleum spirit, and the whole shaken for a few seconds and allowed to stand for 30 minutes. The aqueous layer and any insoluble oil are then drawn off, and the petroleum spirit layer containing the nitro-derivatives in solution is transferred to a stoppered graduated cylinder with a capacity of 30 to 35 c.c., where it is shaken with 5 c.c. of strong sulphuric acid. The cylinder is then allowed to stand for 30 minutes, after which the increase in volume of the acid is noted. This increase multiplied by 0·87 gives the volume of C_6H_6 in the quantity of sample taken.

Phenol, Simple Method of Determining. F. Lehmann. (*Apoth. Zeit.*, 1911, **26,** 55.) The process consists in adding to a solution containing phenol known quantities of solutions of potassium bromide and bromate, acidifying with sulphuric acid, and shaking in a stoppered flask; after fifteen minutes standing the excess of bromine is determined by adding potassium iodide and titrating with thiosulphate. If the bromate solution is made to contain 1·6702 Gm. of $KBrO_3$ in 1 litre, 50 c.c. = 30 c.c. of N/10 thiosulphate; if therefore 50 c.c. of the bromate solution is employed in a given case, the number of c.c. of thiosulphate used is to be deducted from 30, and the difference multiplied by 0·001567 gives the weight of phenol precipitated. The quantity of bromide employed does not affect the result, so long as sufficient is used; from 0·5 to 1 Gm. is a convenient quantity. (See also *Y.B.*, **1909,** 66.)

Picrotoxinin and its Derivatives. C. Cervello. (*Archiv. exper. Path. u. Pharm.*, 1911, **64,** 407.) Picrotoxinin $C_{15}H_{16}O_6$, has the same physiological action as commercial picrotoxin, and as a mixture of picrotin and picrotinin. It is somewhat more poisonous than picrotin, $C_{15}H_{18}O_7$. Acetylpicrotoxinin, crystallizing in thin white needles from EtOH, m.p. 254°C., is more toxic than picrotinin. The acid, $C_{15}H_{18}O_4$, obtained from picrotoxinin and its oxidations appears to be inert. (See also *Gen. Index.*)

Pyramidon, Dimethylamino-antipyrine, Further Errors in French Codex concerning. P. Lemaire. (*Repert. Pharm.*, 1911, **23,** 97.) Pyramidon is not tasteless, as stated in the French Codex. It has a slight bitter taste. It is not soluble 1 : 10 in cold water, if pure. When contaminated with anti-

pyrine it is soluble in that volume of water. The m.p. is not 108°C.; but 105 to 107°C. Other errors have been pointed out previously (*Y.B.*, **1910,** 33). The formaldehyde HCl test is also erroneous. If 1 Gm. of pyramidon, 5 c.c. of water, 5 c.c. of HCl or 2 c.c. of formaldehyde solution are heated for 4 hours in a closed flask in the boiling water-bath, and then when cool made alkaline with ammonia, the appearance of a precipitate in 24 hours does not, as the official test states, indicate the presence of antipyrine due to formation of diantipyrine methane. Under these conditions, pure pyramidon will give a precipitate. But it will be soluble in water; whereas diantipyrine methane is insoluble. The test should be amended by the addition of 10 c.c. of water after cooling the reaction liquid, before adding the ammonia. The m.p. of the precipitate formed should also be taken. That of diantipyrine methane is 178°C.

Pyramidon, New Reaction for. F. Pevenasse. (*Annal. de Pharm.*, 1910, 385; *Pharm. Zeit.*, 1910, **55,** 908.) Aqueous solutions of pyramidon give a bluish precipitate of metallic Ag when treated with dilute $AgNO_3$ solution. This soon assumes a violet-red colour, and is soluble in excess of HNO_3.

Pyrethrum Flowers, Toxic Principle of. E. Reeb. (*J. Pharm. Alsace-Lorraine,* **35,** 267; *Pharm. Zentralh.*, 1911, **52,** 173.) The author resumes his previous investigations and reaffirms the conclusions arrived at in his former work in conjunction with Schlagdenhauffen (*Y.B.*, **1891,** 176) that the main toxic principle is pyrethrotoxic acid. This may be obtained in a free state as follows. Insect powder is extracted by percolation with petroleum ether. After distilling off the solvent the residue is treated with a little alcohol at 60°C., which separates a white powder, the magnesium salt of an acid resin, pyrethresin. After the removal of this the alcoholic solution is evaporated, leaving an oily mass. This is freed from an amorphous sugar by washing with water. The insoluble oily residue is then treated with KOH solution 3 per cent., in which it is partly soluble. The alkaline liquid is acidified with $H_2C_4O_4O_6$, and shaken out with Et_2O. On evaporating the Et_2O pyrethrotoxic acid is left as a honey-like residue. Instead of alcohol a 60 : 100 solution of chloral hydrate may be used to extract the petroleum ether residue. Pyrethrotoxic acid thus obtained is intensely toxic to insects. On frogs the amount equivalent to 2·5 Gm. of the original powder is fatal, by hypodermic injection. On them

it acts as a nervous paralysant, and not as a heart poison. (See also *Y.B.*, 1908, **69**; 1910, **171**.)

Salicylic Acid, Determination of, in Alcoholic Beverages. N. C. Cassal. (*Chem. News*, 1910, **101**, 289.) Direct distillation of alcoholic beverages is unreliable for the determination of salicylic acid. The following method, in which the inhibitory effect of alcohol is avoided, gives satisfactory results. A measured volume of the liquid is acidified with a few drops of strong HCl and extracted three times with 25–30 c.c. of $CHCl_3$. The $CHCl_3$ extract or emulsion is washed with an equal volume of water and extracted three times with about 25 c.c. of water containing a few drops of N/1 NaOH. The alkaline extract is then acidified with H_3PO_4 diluted to 100 c.c., and distilled into a receiver containing 10 c.c. of water; when the volume in the receiver reaches 100 c.c., the distillation is stopped, and the salicylic acid is determined by the usual colorimetric method in an aliquot portion of the distillate. The amount of acid found in the total distillate, multiplied by the factor 5·5, gives the amount present in original liquid. (See also *Y.B.*, **1904**, 160; **1905**, 22; **1907**, 143; **1908**, 16.)

Saccharin, Detection of, in Lemonades. C. Muller. (*Bull. Assoc. Chim. Suc. Dist.*, 1911, **28**, 630; *Chem. Zentralb.*, 1911, **1**, 1383.) The following is stated to give better results for the detection of saccharin in beverages than the published methods. Lemonade, 25 c.c., is made alkaline with Na_2CO_3, and evaporated to 100 c.c. The cold liquid is then shaken out with 10 c.c. of C_6H_6 or Et_2O. After separation, the aqueous liquid is acidified with HCl and again shaken with 10, 10 and 10 c.c. of Et_2O. The Et_2O solutions are evaporated to dryness, and in presence of saccharin, will have a sweet, then bitterish taste. The residue is then warmed to 60°C. with a little water and 2 c.c. of H_2SO_4 1 : 10; treated with $KMnO_4$ solution, 1 : 100, until the red colour is permanent; the latter is removed with $H_2C_2O_4$, and the mixture is shaken out 3 times in succession with Et_2O. The Et_2O solutions are evaporated in a tared capsule, the residue is washed with C_6H_6, dried and weighed. (See also *Y.B.*, **1904**, 159; **1905**, 151; **1908**, 18, 128, 172; **1910**, 163.)

Salvarsan, Constitution of. C. O. Goebel. (*Apoth. Zeit.*, 1911, **26**, 215.) Salvarsan, as found in commerce, contains 2 mols. of water of crystallization; its correct formula is

$C_{12}H_{12}N_2O_2As_2 \cdot 2HCl + 2H_2O$. Consequently, the statement of the makers that it contains 34 per cent. of As is incorrect. It contains only 31·6 per cent.

Santonin, Determination of, in Chocolate Tablets. L. Henrard. (*Annales Pharm. Louvain*, 1911, **17**, 1.) Eight tablets are powdered and extracted with a sufficiency of a mixture of Et_2O, 6 ; $CHCl_3$, 4. After filtering and washing, the solvent is distilled off. The oily residue is saponified by boiling for an hour with 20 c.c. of NaOH solution 1 : 10, and 5 c.c. of alcohol 95 per cent. The soap is dissolved in 100 c.c. of hot water, and salted out by adding 50 c.c. of 1 : 4 solution of NaCl. The separated soap is removed by filtration and washed with NaCl solution ; the bulked aqueous liquid is neutralized with dilute HCl, then acidified with 5 drops of strong HCl, and evaporated to dryness. The residue is extracted with 50 c.c. of the Et_2O–$CHCl_3$ mixture, the solution filtered and evaporated to dryness. The residue is twice in succession treated with 5 c.c. of alcohol, and evaporated to dryness. Finally the residue is dried to constancy and weighed as santonic acid. The weight obtained $\times 0{\cdot}872$ gives the equivalent of santonin.

Scopoletin, Constitution of. C. W. Moore. (*Proc. Chem. Soc.*, 1911, **27**, 119.) Scopoletin, a fluorescent substance obtained from *Scopoa japonica* and several other plants, has been shown to be 4-hydroxy-5-methoxycoumarin, since by prolonged boiling with aqueous potassium hydroxide it is converted into 2 : 4-dihydroxyanisole. When, however, the alkali hydroxide is allowed to act for a few minutes only on scopoletin, 2 : 4-*dihydroxy-5-methoxycinnamic acid* is formed. A number of other compounds have been prepared and characterized.

Skatole in the Wood of Nectandra. J. Sack. (*Pharm. Weekblad*, 1911 [13] ; *Pharm. Zeit.*, 1911, **26**, 302.) The wood of a species of *Nectandra*, known as Pisi wood, probably *N. globosa*, possesses, when freshly cut, an unpleasant stercoraceous odour. This is due to the presence of skatole. The distillate from the finely cut wood gives a violet colour when mixed with a 1 : 20 solution of vanillin in EtOH 96 per cent., and treated with strong HCl. On adding a few drops of 0·5 : 100 solution of $NaNO_2$ to the above the shade is changed to bluish violet, and on boiling with H_2SO_4 to reddish purple. Wool soaked in strong oxalic acid is not affected when brought into contact

with the odorous emanation of the fresh wood in a closed vessel, but filter paper moistened in an alcoholic solution of vanillin and HCl is coloured bluish violet.

Sodium Cinnamate, Titration of. P. Lemaire. (*Bull. Soc. Pharm. Bord.; Repertoire*, 1910, **22**, 295.) Commercial sodium cinnamate is very variable. Some samples are neutral to phenolphthalein, others acid or alkaline. The amount of water present also varies, also the solubility. Since cinnamic acid reacts as an acid to phenolphthalein, but does not affect helianthin, the valuation of the salt is easy by means of volumetric analysis. 1·7 Gm. ($=\frac{1}{100}$ mol.) is dissolved in exactly 100 c.c. of water. Ten c.c. of the solution is then titrated against phenolphthalein with N/10 NaOH or N/10 H_2SO_4, if the solution is either acid or alkaline. Another 10 c.c. of the original solution is then treated with 20 c.c. of N/10 H_2SO_4. After standing, the cinnamic acid is filtered out and the free H_2SO_4 remaining is titrated with N/10 NaOH with helianthin indicator. After making the necessary correction for any free acid or alkali that may have been found in the first titration, the result of the second experiment will indicate the amount of Na present as anhydrous sodium cinnamate.

Sodium Salicylate Crystals, Constitution of. (*Evans' Analyt. Report*, **1910**, 70.) Some large crystals recently examined had been deposited from a concentrated solution under unknown conditions of temperature and strength; they had the composition $C_7H_5O_3Na.6H_2O$, a compound not previously described. The crystals were chiefly monoclinic prisms, and their formation was very erratic.

Sodium Salicylate, Crystallization of. C. A. Hill. (*Pharm. J.*, 1910 [4], **31**, 730.) The large prismatic crystals of the salt, which sometimes separate in cold weather from a 1 : 1 aqueous solution, are shown to contain 6 mols. of water of crystallization having the formula $C_7H_5O_3Na{\cdot}6H_2O$. The commercial salt is anhydrous, as stated by text-books. The formula of the B.P., 1898 $(C_7H_5O_3Na)_2H_2O$ is incorrect.

Solubilities of U.S.P. Organic Acids and Salts. A. Seidell. (*Bulletin No.* 67, **1910**, *U.S. Public Health and Marine Hosp. Service Lab.; Analyst*, 1910, **35**, 520.) The solubilities recorded are determined at 25°C., and are generally expressed in terms

of Gms. dissolved by 100 c.c. of solvent. A table is given of figures obtained thus with water, and with alcohol from 10 to 100 per cent. by weight under these conditions. Another table of the solubilities at the same temperature of the U.S.P. organic acids in organic solvents is also given.

Spices used in Veterinary Medicine, Valuation of. J. C. Umney and C. T. Bennett. (*Analyst*, 1911, **36**, 263; *Pharm. J.*, 1911, **32**, 596.) In view of the wide-spread use of low grade material for grinding for veterinary powders, it is essential to have some standards of quality for these. The authors suggest the following :—

Cinnamon.—Cinnamon powder does not appear to be much adulterated. The figures for ash vary from 2·6 to 5·6, and for ether extract 1·5 to 2·9 in the quills, while in the powders the figures are respectively 3·1 to 7·3, and 1·9 to 2·6, and in none of the powders in commerce have any extraneous matters such as walnut shells been detected.

Pimento.—There can be no question that an ash limit of 5 per cent., as usually adopted, is full high, as the figures confirm. They are for ash, 3·3 to 4·8; for ether extract, 5·7 to 9·6.

Fœnugreek.—Ash, 3·8 to 4·7, and ether extract, 6·1 to 6·5.

Anise.—The following are the figures of samples of fruits examined within the last year as imported; together with samples of powders, in every instance the powders being guaranteed to be genuine: Ash, whole fruits, 6·8 to 35·2; ether extract, nil; powder, 6·2 to 22·7; ether extract, 21·6 to 26·2. Dealing with the fruits, certain samples having an extremely high ash on examination were found to be adulterated with particles of sand, evidently most carefully prepared so as to deceive the casual observer examining the bulk of the fruit.

In the case of many of the powders not only is the ash percentage very high indeed, but the extractive to ether is low, and microscopic examination of the powder shows that unquestionably a considerable quantity of exhausted fruits have been used for the powder. It should be pointed out that the oils of anise, fennel, caraway, and cummin are distilled from the fruits in an unbroken condition, the exhausted fruits being resold either for legitimate purposes of cattle feeding or for the purpose which is now accentuated and deplored.

In the authors' opinion it is desirable that an ash should be stated in the Pharmacopœia as a minimum for anise, and that

figure they would certainly fix at the very highest point at 9, if not at even 8 per cent.

Caraway.—Ash, 6·1 to 20·7.

The ash figures recorded for fair samples of caraway agree within very narrow limits, and may be taken as being from 5 to 7 per cent., and the ash fixed in the Pharmacopœia of 1898, namely, not to exceed 8 per cent., is a fair one.

Several of the powders examined show unmistakable evidence of admixture with exhausted fruits.

Coriander Fruits.—There can be no question that an ash limit of 6 per cent. is as high as one need go, whilst the average of fair fruits is as a rule below 5 per cent., with a proportionately slightly higher figure for the powder. Many of the powders examined are highly unsatisfactory, and an ash of 11 per cent. is not by any means uncommon, with a proportionate reduction in the value of the ether extractive. The normal ether extractive is 21 to 22 per cent. The figures for ash vary from 6·9 to 10·7; for ether extract, from 16·1 to 22·7.

Fennel Fruits.—There is probably more variation in the characters of fennel fruits as imported from different parts of the world than in any other of the umbelliferous fruits; but there is no question that many of the powders met with in commerce are prepared from exhausted fruits, especially those imported from Hamburg. The exhausted fruits have been carefully dyed to a greenish tint. The ash should not exceed 10 per cent. The figures for ash, whole fruits, are 4·8 to 16·3; ether extract, 18·4 to 20·8; powder, 8·5 to 26·4; ether extract, 15·2 to 19·2.

Cummin.—Though this spice is not used for human consumption, except as an ingredient in curry powder, its use in veterinary medicines is very extensive, and the varieties imported show great variation. The authors' observations show that a fair sample yields about 6 per cent. to 7 per cent. of ash, whilst commercial powders in many instances are much higher and notably deficient in extractive to ether. The figures are: Ash, 6·1 to 11·4; ether extract, 21·2 to 29·8.

The difference in the character of the powder having only 21·2 of ether extract compared with one having 29·8 is most marked, the former being very dry in character, that containing 29·8 almost "massing" by the pressure of the hand. In conclusion, we are of opinion that any of the powders, more especially those of umbelliferous fruits, sold for veterinary purposes, are

not of such character as could be held to be of the "nature and substance demanded" under the Sale of Food and Drugs Act, 1875, neither could their characters be upheld under the Merchandise Marks Act.

Sweet Almonds, Lipolytic Enzyme in. — Tonegutti. (*Staz. sperim. agrar. ital.*, 1910, **43**, 723–734; *Chem. Zentr.*, 1911, **1**, 332.) If 5 Gm. of powdered almonds be allowed to stand in contact with 10 c.c. of chloral solution at 25°C., the acidity of the solution increases up to a certain limit, but no such increase takes place if the almonds be previously dried at 100°C. The production of acid must therefore be due to a lipase. In a further series of experiments, 4 Gm. of powdered almonds, 5 c.c. of various fatty oils, and 10 c.c. of chloral solution, were made into an emulsion and allowed to stand, with and without addition of 3 c.c. of N/10 H_2SO_4. In all cases a very marked increase in the acidity was observed with almond, olive and castor oils. The lipolytic activity of the almonds increases considerably on germination. A mixture of 5 Gm. of almonds, 5 Gm. of olive oil and 10 c.c. of chloral solution required 4 c.c. of N/10 potassium hydroxide immediately after preparation, and 12·5 c.c. after 4 hours. The same mixture with the addition of 1 Gm. of germinated almonds required 5 c.c. immediately after preparation and 33·5 c.c. after 4 hours. Emulsin was found to possess no lipolytic activity either in acid or alkaline solution. [These results confirm the experience of pharmacists that almond emulsion is not a stable vehicle for many oily drugs.—Ed. *Y.B.*]

Thymo-quinone, Higher Oxidation Products of. N. Wakeman. (*Proc. Amer. Pharm. Assoc.*, 1910, **58**, 979.) The author has obtained dihydroxythymoquinone in red crystals from the residues obtained in the investigation of *Monarda fistulosa*. This is considered to occur as such in the plant, together with other higher oxidation products of quinone, some of which are described in detail.

Vanilla Essence and Imitations, Method for Distinction between. A. L. Winton and C. I. Lott. (*U.S. Depart. Agric. Bullet.*, No. 132, 109; *Analyst*, 1910, **35**, 524.) Fifty Gm. of the sample is diluted to 80 c.c. with water and evaporated at 70°C. to 50 c.c. Another 30 c.c. of water is then added, and the evaporation is repeated, the residual 50 c.c. being transferred to a 100 c.c. flask. Twenty-five c.c. of 8 : 100 normal lead acetate solution is added and the mixture made up to 100 c.c.

After several hours the clear liquid is filtered and the vanillin and coumarin determined by the method of Hess and Prescott (*Y.B.*, **1900,** 94) in 50 c.c. of the filtrate. To another 10 c.c. of filtrate, water 25 c.c., a slight excess of H_2SO_4, and alcohol 95 per cent., 100 c.c., are added. After standing 16 hours the $PbSO_4$ is collected and weighed when dried. The "lead number" P is then found by the equation:

$$P = \frac{100 \times 0{\cdot}6831(S - W)}{5}$$

in which S = weight of $PbSO_4$ found in 2·5 c.c. of the lead acetate solution, by a previous determination; and W = the weight of lead sulphate obtained from the 10 c.c. of filtrate. If basic lead acetate solution be used the vanillin results are worthless. Commercial extracts guaranteed to be genuine yielded normal lead number of from 0·29 to 0·34. Ten per cent. extracts of Seychelles' vanillin had a normal lead number of 0·35; South American vanilla, 0·50; Comores, 0·37; Tahiti, 0·29; Bourbon, 0·61. Twelve per cent. extract of Mexican vanilla gave normal lead number 0·61, and of Vanillons 0·64. The vanillin in these extracts determined by the above process ranged from 0·09 in that from Vanillons to 0·24 in Comores.

Vinegar Malt, Composition of. E. Russell and T. R. Hodgson. (*Analyst*, 1910, **35,** 346.) Nine samples of genuine malt vinegar are found to give the following minimum and maximum figures. Sp. gr. 1·0137 to 1·0221; acetic acid, 3·96 to 6·36 per cent.; total solids, 1·47 to 3·15 per cent.; original solids, 9·54 to 13·41 per cent.; ash, 0·18 to 0·60 per cent.; alkalinity of ash as K_2O, 0·016 to 0·040 per cent.; phosphates, as P_2O_5, 0·092 to 0·047 per cent. A sample sold as malt vinegar, but prepared "without the use of malt." gave results well within these limits, except that the P_2O_5 was only 0·020 per cent. Other samples of wood vinegar and one dubious sample sold as "malt vinegar" had no P_2O_5, and in these the total solids ranged from 0·431 to 0·691 per cent., and the ash from 0·034 to 0·63 per cent. The authors conclude that the determination of the alkalinity of ash with methyl orange indicator is of little value. No standard is necessary to differentiate between genuine malt vinegar and wood vinegar. The standard for malt vinegar might be: Acetic acid, not less than 3·5 per cent.; P_2O_5, not less than 0·05 per cent. The standard of the U.S.A., acetic acid, 4 per cent.; total solids, 2·0 per cent.; ash.

0·2 per cent.; P_2O_5, 0·009 per cent., is useless, as a fictitious sample will easily pass this. (See also *Y.B.*, **1909,** 54; **1910,** 164; and *Gen. Index.*)

Vinegar, Wine, Characterized by Presence of Inositol. P. Fleury. (*J. Pharm. Chim.*, 1910, **2,** 264.) Mellière has proved that inositol is a constant constituent of wines, and it has since been found by the author that this sugar is not affected by acetous fermentation, so that the presence of inositol serves as evidence of the original source of these vinegars from grape juice, and to distinguish them from those derived from alcohol and other sources. To determine its presence, 100 c.c. of the vinegar is evaporated almost to dryness on the water-bath to drive off the acetic acid. The residue is taken up with 50 c.c. of water, neutralized with sodium hydroxide and mixed with 3 Gm. of Ba2OH; the precipitate formed is separated by centrifugation and washed with 20 or 30 c.c. of Ba2OH solution. The bulked liquid is then freed from excess of Ba, either by means of a current of CO_2, or by H_2SO_4 added to neutrality; 10 c.c. of saturated solution of $Pb2C_2H_3O_2$ is then added, and the precipitate formed is removed by centrifugation. The clear liquid thus obtained is made up to 100 c.c. and treated with 10 c.c. of basic lead acetate solution and 2 Gm. of $Cd2NO_3$ dissolved in water. The bulky precipitate which results carries down the inositol. It is collected and decomposed with H_2S. The filtrate, after removing the PbS, is evaporated to a syrup, treated with 20 c.c. of absolute EtOH, and 5 c.c. of anhydrous Et_2O is added to precipitate the inositol. After standing for 24 to 48 hours, the precipitate is collected and identified as inositol by the usual reactions. All the genuine wine vinegars examined by this method afforded the characteristic reactions.

Xanthaline identical with Papaveraldine. B. Dobson and W. H. Perkin. (*J. Chem. Soc.*, 1911, **99,** 135.) Xanthaline (*Y.B.*, **1893,** 46) has not the formula $C_{37}H_{36}O_9N_2$, but $C_{20}H_{19}O_5N$. It forms coloured scales when crystallized from methyl ethyl ketone, m.p. 210°C. (corr). It contains four methoxyl groups. The iodomethylate and platino-chloride are described. When fused with KOH it forms dimethoxyisoquinoline and veratric acid. It is therefore identical with Goldschmiedt's papaveraldine.

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PLANT ANALYSIS

Acid, Chlorogenic, Distribution of, in Vegetable Kingdom. C. Charaux. (*J. Pharm. Chim.*, 1910, **2,** 292.) Chlorogenic acid is very widely distributed in the vegetable kingdom. By decomposing this acid into caffeic acid, a simple method for isolating which is given, the author has been able to detect its presence and to determine its amount in plants belonging to the following natural orders, given in the order of relative quantity obtained: *Orobanchaceae, Scrophulariaceae, Labiatae, Verbenaceae, Aquifoliaceae, Compositae, Jasminaceae, Solanaceae, Ranunculaceae, Dipsacaceae, Liliaceae,* and *Caprifoliaceae.* The amount of caffeic acid isolated varied from 10 per cent. to 0·06 per cent.; equivalent to twice as much chlorogenic acid. The highest yield was derived from the subterranean bulbous portion of *Orobanche rapum*, which contains as much as 20 per cent. of chlorogenic acid at certain periods of its growth. The smallest amount was obtained from elder flowers. (See also *Y.B.*, **1908,** 55; **1910,** 147.)

Acid, Formic, in Raspberries. Rohrig. (*Pharm. Zentral.*, 1910, **15,** 880.) Formic acid is a natural constituent of raspberries. The quantity present is very small, equivalent to 0·0001761 per cent. of the fresh fruit, and to 0·0000722 per cent. after fermentation. Its presence was determined by Wagner's method, which consists of distilling the fruits, neutralizing with caustic soda, evaporating to dryness, and treating the dry residue with sulphuric acid in a special apparatus, measuring the volume of carbon monoxide formed. Each c.c. of this gas is equivalent to 2 milligrammes of formic acid.

Adenium hongkel. M. Leprince. (*Bull. Sci. Pharm.*, 1911, **18,** 337.) This poisonous West African plant is figured and its anatomical structure detailed. Chemical examination showed it to be free from alkaloids, but a very active amorphous poisonous principle has been isolated, which, although not a glucoside, is stated to be a definite chemical substance, adeniin, $C_{19}H_{28}O_8$; it melts at 84–85°C. with the $[\alpha]_D + 134°$ in alcoholic solution. It gives an intense red colour reaction on contact with H_2SO_4. It is very poisonous to some animals and acts simultaneously on the nervous system and on the myocardium. It increases the arterial tension. Its toxicity varies with different species of animals. The plant is known by the native name

"Kidi sarané." The juice exuded by breaking off a bud is applied to ulcers, or to decayed teeth. It is also used for criminal poisoning. (See also *Y.B.*, **1909,** 31 ; **1910,** 165.)

Adiantum Leaves, Volatile Crystalline Substance in. O. Tunmann. (*Schweiz. Woch.*, 1910, **48,** 749.) The dried leaves of *Adiantum capillus-veneris*, exported from Italy and employed as a drug in continental pharmacy, yield a crystalline prismatic sublimate when gently heated. The same substance occurs in $CHCl_3$ extract of the leaves. It has not yet been identified, but is neither coumarin, vanillin nor benzoic acid. It does not occur in the fresh leaves.

Aldehydic Constituent of Leaves. — Franzen. (*Pharm. Zeit.*, 1910, **53,** 804.) The aldehydic substance which has been known to occur in the distillate from leaves of plants has been isolated and identified as α-β-hexalene aldehyde, $CH_3{\cdot}CH_2{\cdot}CH_2{\cdot}CH{\cdot}CH{\cdot}CH{\cdot}C\langle^{O}_{H}$. It forms a hydrazone with boiling solutions of benzene hydrazide, in yellow needles, m.p. 167°C. The aldehyde occurs in the distillate of the leaves of nearly all the plants examined ; horse-chestnut, vine, lady-fern, hornbeam, alder, maple, oak, lupin, clover, beech, raspberry, nut and walnut. All these give a hydrazone melting at 167–168°C. The edible chestnut and the lime tree give one melting at a higher point 234–237°C. This aldehyde is so widely distributed that it probably plays an important part in plant assimilation. Since it contains a similar structure to glucose, it may be connected with the formation of that or similar sugars. [This may indicate the nature of the constituent of *Liquor Hamamelidis*, which has wrongly been stated to be formaldehyde. —Ed. *Y.B.*]

Amanita muscaria, Some Constituents of. J. Zellner. (*Monats. Chem.*, 1911, **32,** 133 ; *Chem. Zentralb.*, 1911, **1,** 1303.) The fly agaric contains an ergosterin, probably identical with Tanret's ergosterin from ergot. It occurs in leaflets or needles, $C_{26}H_{40}O + H_2O$, m.p. 159°C. The fatty matter of the fungus also yields a N-compound allied to cerebrine. This is probably a decomposition product formed by drying or keeping. Chitin, found by Scholls in other fungi, is also present in *Amanita*. (See also *Gen. Index.*)

Antiaris toxicaria, Milky Juice of. H. Kiliani. (*Berichte*, 1910, **43**, 3574.) The author has resumed his investigation of Antiaris latex, and finds that it contains, besides the antiarin, *a*-antiarin, previously described by him, a much larger quantity of a second antiarin, *β*-antiarin; the juice previously examined gave no indication of the presence of such a compound. The two antiarins are found to present no difference in respect of toxicity, and to retain their toxicity in aqueous solution unchanged after 3 days' storage in a loosely stoppered flask. *a-Antiarin* forms tabular crystals, m.p. 220°–225°C. Its hydrogen-content is less than that previously found, but provisionally there is no occasion to alter the formula, $C_{27}H_{42}O_{10} + 4H_2O$, which, however, requires more exact confirmation. The compound undergoes alteration on heating with N/10 NaOH; it is not affected by treatment with emulsin for 20 hours at 33°–35°C.; it is only slowly decomposed on heating with dilute HCl; it is attacked by $KMnO_4$ readily at the ordinary temperature, and very vigorously on heating, a crystalline product being obtainable. *β-Antiarin* crystallizes in needles or in prisms, m.p. 206°–207°C.; neutral; free from nitrogen and mineral matter, and is a glucoside. Analysis shows that it may possess the formula $C_{27}H_{38}O_{10} + 3H_2O$, or $C_{28}H_{38}O_{10} + 3H_2O$. It does not appear to be decomposed more easily than the *a*-antiarin.

Asclepias vincetoxicum Rhizome, Chemical Constituents of. G. Masson. (*Bull. Sci. Pharm.*, 1911, **18**, 93.) The active principle of *Asclepias* appears to be a saponoid. In the free state this is insoluble in water, but its alkali salts are soluble. The saponoid was isolated by dialysing the solution of the salt with dilute acid. The pure saponoid thus obtained is named asclepiasic acid. It is a yellow, amorphous powder, optically inactive, melting at 90-91°C., soluble in acetic ether, acetic acid, and alkalies; insoluble in water; precipitated by lead acetate and barium hydroxide. The acid is hydrolysed by boiling with dilute sulphuric acid into glucose and an insoluble, red, amorphous substance.

Brazilian Rosaceous Medicinal Plants, Examination of. T. Peckolt. (*Berichte Pharm.*, **20**, 585.) *Prunus sphærocarpa.* The fresh leaves give, in summer, 0·085 per cent. of HCN on distillation; in winter 0·0016 per cent.; and in spring, 0·005 per cent. The twigs and outer bark give 0·046 per cent. of essential

oil, sp. gr. 1·0409 at 18°C., resembling essential oil of almonds in odour. *Eriobotrya japonica*.—The fruit pulp contains glucose and free acids, besides water. The fresh seeds contain 0·15 per cent. of amygdalin, and on distillation yield 0·016 per cent. of HCN. The flowers give on distillation 0·157 per cent. of essential oil, free from HCN, and having an odour of heliotrope and parsley oil.

Bryonia dioica, Constituents of. F. B. Power and C. W. Moore. (*Proc. Chem. Soc.*, 1911, **27**, 118.) The fresh roots were found to contain an enzyme, which was obtained in the form of a light brown powder. This product slowly hydrolysed the glucosidic constituent of the root, and also effected the hydrolysis of amygdalin and salicin. An alcoholic extract of the root, when distilled in steam, yielded a small amount of a pale yellow essential oil. From the portion of the extract which was soluble in water, and contained a quantity of sugar, there were isolated: (i) A colourless neutral substance, m.p. 220–222°, which appears to possess the formula $C_{20}H_{30}O_5$, and has $[\alpha]_D$ + 58·6°; (ii) an amorphous glucosidic product, having a bitter taste, which on hydrolysis yielded a brown resin and a sugar, from which *d*-phenylglucosazone, m.p. 208–210°, was prepared; (iii) an amorphous alkaloidal principle, possessing an intensely bitter taste, which was apparently incapable of forming any crystalline salt. The portion of extract which was insoluble in water consisted of a dark brown viscid resin, amounting to about 2 per cent. of the weight of dried root employed. From this material the following compounds were isolated: (i) A phytosterol, $C_{27}H_{46}O$, m.p. 137°, which was optically inactive; (ii) a new dihydric alcohol, bryonol, $C_{22}H_{34}O_2(OH)_2$, melting at 210–212°, and yielding a diacetyl derivative, melting at 152°. Bryonol belongs to a group of dihydric alcohols possessing the general formula $C_nH_{2n-8}O_4$, which comprises the following additional compounds: Ipurganol, $C_{21}H_{32}O_2(OH)_2$; grindelol, $C_{23}H_{36}O_2(OH)_2$; and cucurbitol, $C_{24}H_{38}O_2(OH)_2$; (iii) oleic, linolic, palmitic, and stearic acids. The activity of the root appears to reside chiefly in its resinous and alkaloidal constituents, and the so-called "bryonin" of previous investigators has been shown to consist of a complex mixture, which was not entirely glucosidic.

Buphane disticha, Bulb Constituents of. F. Tutin. (*Proc. Chem. Soc.*, 1911, **27**, 149; *Pharm. J.*, 1911, [4], **32**, 786.)

Buphane disticha (N.O. *Amaryllidaceæ*) is a South African plant, with large bulbs. The bulbs were formerly used by the natives in the preparation of arrow poison, and the dry outer portions are now employed by them for surgical bandages. The alcoholic extract, when steam-distilled, yielded a little essential oil. The distillation residue consisted of an aqueous liquid and resinous matter. From the aqueous liquid there was obtained, by extraction with ether, a small quantity of acetovanillone, which has been previously isolated by Finnemore (*Y.B.*, **1908,** 20) and by Moore from species of *Apocynum*. On making the aqueous liquid alkaline and shaking out with ether, two amorphous bases were extracted. One is a strongly basic substance, which has been named buphanitine. It gives no crystalline salts, but when hydrolysed with caustic alkali it yields a new alkaloid, $C_{23}H_{24}O_6N_2$ (named buphanine), which forms a well-defined hydrochloride and methiodide. The other amorphous substance found in the ethereal extract is a weakly basic alkaloid from which no crystalline salts were obtained. The alkaline liquid was next extracted with amyl alcohol, when a water-soluble amorphous alkaloid was obtained, and also a crystalline base, $C_{16}H_{17}O_4N$, which is identical with narcissine. The remaining liquid was found to contain copper, and after its removal a crystalline product was isolated ; this substance was recrystallized from dilute hydrochloric acid, when there were obtained glistening colourless needles, which were found to consist of the acid sodium salt of chelidonic acid. Sugar was also present. The resinous residue was extracted with various solvents. The petroleum extract contained the hydrocarbon pentatriacontane, a phytosterol, and several of the common fatty acids, and in the ethereal extract there was found a small quantity of ipuranol. The physiological action of the new substances has been investigated by P. P. Laidlaw, with the following results : The strongly basic substance (buphanine) resembles hyoscine, but its action is less persistent ; the crystalline hydrolytic base (buphanitine) is inactive ; the weakly basic substance is a convulsant poison, while the effect of the water-soluble base resembles that of narcissine and colchicine.

Coffee, Constituents of. K. Gorter. (*Liebig's Annalen*, **358,** 327 ; **359,** 217 ; **362,** 237 ; *J. Pharm. Chim.*, 1910, **2,** 69.) Caffeine does not exist free in coffee, but is combined with potassium and chlorogenic acid. This compound has been isolated

in a pure state, in colourless prismatic crystals grouped in bundles. The formula is $C_{32}H_{36}O_{19}K_2(C_8H_{10}N_4O_2)_2 + 2H_2O$. It decomposes without melting at about 225°C. The compound is obtained by percolating Liberian coffee with alcohol 66 per cent. The percolate thus obtained contains a gummy substance, which is precipitated by the addition of alcohol 95 per cent. On then concentrating the alcoholic solution *in vacuo* to a syrup, the double chlorogenate crystallizes out. It is purified by recrystallizing alcohol from 60 per cent. The yield is 3·3 per cent. The salt is scarcely decomposed by dry chloroform, but easily parts with its caffeine to that solvent in the presence of water. This explains why dry coffee only yields about one-tenth of its caffeine to prolonged extraction with chloroform, but readily gives up the whole of its alkaloid to that solvent in 2 or 3 hours in the presence of water. The chlorogenic acid from coffee, $C_{32}H_{38}O_{19}$, crystallizes from water in small colourless needles, m.p. 206–207°C.; a_D −33·1°; hydrolysed by alkalies forming caffeic and quinic acids, according to the equation—

$$C_{32}H_{38}O_{19} + H_2O = 2C_9H_8O_4 + 2C_7H_{12}O_6.$$

Besides this, the mother liquors, after separating the potassium caffeine chlorogenate, yield another acid, $C_{34}H_{54}O_{15}$, crystallizing from alcohol in orthorhombic colourless crystals, m.p. 255°C.; sparingly soluble in water and in strong alcohol; its taste is sweetish. It furnishes iso-valerianic acid when heated with acids or alkalies. It has been named caffalic acid. In addition to these constituents Liberian coffee contains citric acid, trigonelline, a pectin, and an oxydase. The so-called caffetannic acid of other investigators is a mixture of chlorogenic and caffalic acids with other substances.

Derris elliptica, Crystalline Constituent of Root of. W. Lenz. (*Archiv. Pharm.*, 1911, **249**, 298.) From the same plant that Greshoff and Wray have isolated derrid and tubcin, the author has isolated a crystalline substance, derrin, by extracting the root with boiling C_6H_6. It forms yellowish scales, which become almost colourless when washed with Et_2O or crystallized from EtOH. M.p. 158°C. Readily soluble in acetone, C_6H_6, $CHCl_3$; less soluble in cold Et_2O and EtOH. It is the active toxic principle of *Derris*, and is probably a lactone.

Erythrea centaurea, Constituents of. B. Reis. (*Apoth. Zeit.*, 1911, **26**, 148.) The aqueous extract of the herb, prepared

at 50°C. in the presence of calcium carbonate, yields erythrocentaurin, $C_{10}H_{10}O_3$, crystallizing from absolute alcohol in colourless prisms, melting at 145°C., coloured red by exposure to light without altering the m.p.; a new substance of lactonic nature, $C_{10}H_{10}O_4$, melting at 225–275° (?). In addition to these constituents, the drug contains a phytosterol, $C_{26}H_{34}O$, melting at 79°C., also ceryl alcohol, with stearic and palmitic acids. The glucoside erytaurin (*Y.B.*, **1909,** 34) could not be detected.

Gelsemium sempervirens Rhizome, Constituents of. C. W. Moore. (*Proc. Chem. Soc.*, 1910, **26,** 247.) An alcoholic extract of the drug, when steam-distilled, yielded a small quantity of an essential oil. The non-volatile constituents consisted of a brown resin insoluble in water, and material which remained dissolved in the cold aqueous liquid. The resin, which amounted to about 3·8 per cent. of the weight of the drug, yielded pentatriacontane; traces of emodin monomethyl ether; a phytosterol, $C_{27}H_{46}O_3$ m.p. 136°; $[a]_D$—40·4°; a small amount of ipuranol, $C_{23}H_{38}O_2(OH)_2$; and a mixture of palmitic, stearic, oleic, and linolic acids. The portion soluble in water contained scopoletin (a monomethyl ether of æsculetin), present in the free state, and also as a glucoside, together with a quantity of sugar. It yielded also three alkaloidal products, one of which, *gelsemine*, $C_{20}H_{22}O_2N_2$, has been obtained in a pure crystalline state, melting considerably higher than has hitherto been recorded (178°C. instead of 160°C.). The other alkaloidal products, one of which corresponds with the so-called "gelseminine" of Thompson (*Y.B.*, **1887,** 61) and Cushny were amorphous, and no crystalline derivatives could be obtained from them. (See also *ante*, p. 31 and *Y.B.*, **1906,** 210; **1907,** 71; **1908,** 86; **1909,** 37; **1910,** 23.)

Grindelia, robusta, Constituents and Pharmacology of. J. Dore. (*Monograph*, Toulouse, 1910; *Pharm. Post*, 1910, **43,** 646.) The commercial drug is rarely pure. It is often mixed with other species, especially *G. squarrosa* and *G. camporum*. From the pure drug, obtained from a German firm, the author has obtained, by Schneegan's method, indications of the presence of two glucosides, allied to saponins. Evidence of the presence of alkaloids was also found. The basic material was obtained as follows: The drug was extracted with EtOH and $H_2C_4H_4O_6$. The solvent was distilled off, and the acid residue freed from colouring matter and resins by treatment

with $CHCl_3$. It was then dissolved in water, made alkaline, and the liberated alkaloids were shaken out with $CHCl_3$. On evaporating this solvent the residue, after being purified in the usual manner, was a brown mass, easily soluble in water, and giving alkaloidal reactions with KI, and with bismuth-potassium iodide reagent. The drug is stated to be therapeutically active, and in large doses, toxic. The publication is illustrated, and is in four parts, dealing with the botanical, chemical, pharmacological and clinical aspects of the drug. (See also *Y.B.*, **1906,** 39 ; **1907,** 198 ; **1908,** 88 ; **1910,** 200.)

Helleborus niger, Aquilegia vulgaris, Caltha pulustris and Delphinium consolida, Investigation of. O. Keller. (*Archiv. Pharm.*, 1910, **248,** 463, 468.) The roots of *Helleborus niger*, and probably those of *H. viridis* also, contain no alkaloid. The former has yielded the author 0·045 per cent. of the glucoside helleborin, in crystals melting at 269–270°. Neither the flowers, herb, nor seeds of *Aquilegia vulgaris* are found to contain alkaloid. *Caltha pulustris* herb gave a small amount of a non-volatile base, which cannot therefore be identical with nicotine, as Johannsen has stated. It forms a crystalline hydrochloride and platinochloride. Contrary to the experience of Masing, who isolated a base, calcatripine, from the flowers of *Delphinium consolida*, the author finds these flowers to contain no alkaloid. The seeds of the plant, however, yield three alkaloids. One of these crystallizes from alcohol in thick tablets, m.p. 195–197°C., but it readily becomes decomposed on further treatment to a transparent amorphous mass. Crystalline salts have not yet been obtained. This base is soluble in ether. Another alkaloid is amorphous and almost insoluble in ether. The third alkaloid, also amorphous, is readily soluble in that solvent. The crystalline base is not identical with Merck's pure crystalline *delphinine*, which is separable by recrystallization from alcohol into six-sided tablets melting at 187·5°C., and into pointed aggregated needles which have no sharp melting-point, yet fuse at a higher temperature than the tablets.

Ipomea horsfalliæ Tubers, Constituents of. F. B. Power and H. Rogerson. (*Amer. J. Pharm.*, 1910, **82,** 355.) The material examined consisted of a single large root received from E. M. Holmes, to whom it was sent from Jamaica. It is originally an East Indian species, and has doubtless been introduced into Jamaica, where it now grows wild. It is there

used for starch making. It has been cultivated for many years in this country as a stove plant, and bears most attractive flowers in December and January. The dried root yielded 2·5 per cent. of resin, which had the $[\alpha]_D - 28{\cdot}4°$ in alcoholic solution. A crystalline substance, m.p. 132–133°C., giving phytosterol reactions, and another crystalline body, m.p. 56–58°C., were isolated from the petroleum ether extract of the resin. The alcohol extract gave evidence of the presence of a glucoside. The aqueous liquid remaining after the steam distillation of the resin contained a sugar and traces of what was probably β-methyl æsculetin. The resin appears to contain no constituent of medicinal value, and to be devoid of any marked physiological action.

Iris versicolor Rhizome, Chemical Investigation of. F. B. Power and A. H. Salway. (*Amer. J. Pharm.*, 1911, **83**, 1.) The therapeutic activity of the fresh rhizome of *Iris versicolor* appears to be well established, but the opinion already recorded that the drug deteriorates with age is confirmed. The commercial drug examined is found to be devoid of physiological activity. The absence of alkaloids and of glucosides having been established, the ground material was extracted with alcohol. The extract thus obtained yielded, on distillation, a small amount of yellow unpleasant smelling essential oil, sp. gr. 0·9410, at 20°/20°C. The portion of the alcoholic extract soluble in water contained a little iso-phthalic acid which has not been previously recorded as a plant constituent. A probable trace of salicylic acid, with tannin, and a sugar yielding *d*-phenylglucosazone, m.p. 212°C., were also present. The portion of the extract insoluble in water consisted mainly of a soft, dark resin, amounting to 8·7 per cent. of the drug. From this, the following definite products were isolated: A phytosterol, $C_{27}H_{46}O + H_2O$, m.p., when anhydrous, 148°C., $[\alpha]_D - 35{\cdot}6°$ in $CHCl_3$; myricyl alcohol, $C_{31}H_{64}O$; heptacosane, $C_{27}H_{56}$; ipuranol, $C_{23}H_{38}O_2(OH)_2$; and a mixture of lauric, palmitic, stearic, cerotic, oleic, and linolic acids. No definite substances were found to which the reputed properties of the drug could be referred. Physiological experiments with the total alcoholic extract, the total resinous portion, the portion of the alcoholic extract soluble in water, and the aqueous extract of the drug, prepared without heat, were all without definite result.

Kolatein, a New Phenolic Constituent of Kola Nuts. A. Goris. (*Bull. Sci. Pharm.*, 1911, **18**, 139.) After kolatin (*Y.B.*, **1906**, 44; **1908**, 88) has been crystallized out, the mother liquor, on concentration, yields a further crop of large crystals, 1 cm. long and 2 to 3 mm. thick, which can be easily distinguished from kolatin crystals by their appearance. This substance is quite distinct from kolatin; it melts at a much higher temperature, 257–258°C. Kolatin melts at 148°C. It has been named kolatein. It is of a phenolic nature, and appears to be allied to phloroglucinol, which melts at 127°C. It gives a green colour with Fe_2Cl_6, not a violet blue like the former phenol.

Lasiosyphon meissnerianus Root, Chemical Examination of. H. Rogerson. (*Amer. J. Pharm.*, 1911, **83**, 49.) The root of this Thymelaceous South African plant, a reputed remedy for snake bite, has failed to yield any definite active principle to systematic chemical examination. It contains an amorphous acrid resin, a phytosterol, fatty acids, and a sugar, yield a *d*-phenylglucosazone, m.p. 204–205°C.

Leptandra, Constituents of. F. B. Power and H. Rogerson. (*Proc. Chem. Soc.*, 1910, **26**, 218.) Commercial "leptandra," the dried rhizome and roots of *Veronica virginica*, L. (*Leptandra virginica*, Nuttall), was extracted with alcohol. After removing the solvent, the extract when distilled in a current of steam, yielded a small amount of a dark coloured volatile oil distilling between 120° and 160°C. under 25 mm. The portion of the extract which was soluble in water contained 3 : 4-dimethoxycinnamic acid, $C_6H_3(OCH_3)_2{\cdot}CH : CH{\cdot}CO_2H$, m.p. 180–181°; a quantity of mannitol, amounting to 2·14 per cent. of the weight of the drug; and a sugar which yielded *d*-phenylglucosazone, m.p. 209°–211°; together with tannin and colouring matter. It yielded, also, a quantity of an amorphous product, which possessed an intensely bitter, nauseous taste, and amounted to 1·6 per cent. of the weight of the drug. By the hydrolysis of this, cinnamic and *p*-methoxycinnamic acids were obtained, besides resinous matter. The portion insoluble in water consisted chiefly of a dark brown resin, which amounted to 6·2 per cent. of the weight of the drug. From this the following substances were obtained: a phytosterol, verosterol, $C_{27}H_{46}O$, m.p. 135–136°; $[a]_D$ — 33·0°, the acetate of which melts at 119–120°; a mixture of fatty acids, consisting apparently

of oleic, linolic, palmitic, and stearic acids; *p*-methoxycinnamic acid, $OCH_3 \cdot C_6H_4 \cdot CH : CH \cdot CO_2H$, m.p. 170°, which was present in the form of an ester; and a very small amount of 3 : 4-dimethoxycinnamic acid. Neither leptandrin, the supposed crystalline glucoside, nor saponin could be detected.

Lichens, Chemical Investigation of. O. Hesse. (*J. prakt. Chem.*, 1910, **83,** 22.) This, the twelfth, communication on the systematic examination of the lichens, deals with the constituents of certain members of the following genera: *Evernia*, *Cladonia*, *Cetraria*, *Sticta*, *Parmelia* and *Urceolaria*.

Plectranthin, the Non-toxic Bitter Principle of Plectranthus glaucocalyx, var. Japonicus. S. Yagi. (*Arch. Internat. Pharm.*, **1910** [2]; *Nouveaux Remèdes*, 1910, **28,** 13.) The Japanese labiate, *Plectranthus glaucocalyx*, is used by the natives as a domestic remedy for stomachic disorders. It is found to contain a crystalline bitter principle, plectranthin, m.p. 220°C. This does not reduce alkaline cupric solutions, nor ammonio-silver nitrate. It gives no precipitate with tannin nor with lead acetate, but is thrown down by basic lead acetate. Slightly soluble in water; readily dissolved by EtOH, Et_2O and $CHCl_3$. It is practically inert, when administered either hypodermically or by the mouth, so that the plant furnishes a harmless bitter drug. Plectranthin is intensely bitter; it may be tasted in a dilution of 1 : 400,000.

Prunus, Species of, Substituted for P. serotina, Chemical Constituents of. H. Finnemore. (*Pharm. J.*, 1911 [4], **31,** 580, 604.) The bark was extracted with EtOH and the extract dissolved in water. The aqueous solution when shaken with Et_2O gave on systematic examination (*a*) an acid, m.p. 121°, in quantity too small for analysis; (*b*) a considerable quantity of a new dihydric phenol, $C_{16}H_{12}O_5$, to which the name prunetin is given; and (*c*) fatty bodies from which a phytosterol was obtained, together with a mixture containing palmitic and other acids. When the aqueous solution was shaken with Et_2O, a semi-crystalline precipitate was formed, which on examination proved to be impure prunetin. Prunetin contains a single methoxyl group, and when demethylated by boiling with hydriodic acid yields the corresponding trihydric phenol, $C_{15}H_{10}O_5$, to which the name prunetol is given; the latter is isomeric with

apigenin, the hydrolytic product of the glucoside of parsley, and with galangin from galangal root. The aqueous solution, after shaking with Et_2O, deposited a large amount of a yellow glucoside, identical in composition with quercimeritrin, a glucoside of quercetin recently isolated by A. G. Perkin from cotton flowers (*Y.B.*, **1910,** 57). On still further treatment a colourless glucoside was extracted, which proved to be the mother substance of prunetin, and which is accordingly called *prunitrin.*

Rhamnus catharticus Bark, Constituents of. A. Tschirch and H. Bromberger. (*Archiv. Pharm.*, 1911, **249,** 218.) The extract obtained by boiling the bark with EtOH 90 per cent. separates out crystalline rhamnosterin on cooling, $C_{13}H_{28}O_2$, in microcrystalline rods, m.p. 83–85°C., on drying it aggregates to a brown hard mass which is not affected by alkali. After removing this by filtration, and concentrating, the syrupy residue is poured into a large volume of water. A red precipitate is thus obtained from which frangula-emodin is extracted by Et_2O. The residue, insoluble in Et_2O, gives rhamnofluorin, $C_{14}H_{12}O_6$, by sublimation. This forms grey, microscopic tables from pyridine, chars at above 220°C., is soluble with a greenish yellow fluorescence in alcoholic AmOH, and does not reduce Fehling's reagent. The Et_2O mother liquor from which frangula-emodin was removed yields a substance, $C_{15}H_{10}O_5$, crystallizing from alcohol in red micro-needles in rosettes. This is probably *iso*-emodin. It chars at 305°C., and is soluble in alkalies, with a bluish violet colour. Besides these constituents the bark contains chrysophanol (pure chrysophanic acid uncontaminated with emodin monomethyl ether). The aqueous portion, after precipitating the alcoholic extract, contains tannins and dextrose.

Rhubarb, Constituents of. F. Tutin and H. W. B. Clewer. (*Proc. Chem. Soc.*, 1911, **27,** 89.) An alcoholic extract of Shensi rhubarb, when distilled with steam, yielded small amounts of palmitic and chrysophanic acids, together with a hexoic acid and some essential oil. The portion of the extract which was soluble in water yielded cinnamic and gallic acids, rhein, emodin, aloe-emodin, emodin mono-methyl ether, chrysophanic acid, and a new anthraquinone derivative, $C_{27}H_{10}O_6$, m.p. 295–297°, which is named rheinolic acid. It yielded also, a crystalline mixture of the glucosides of rhein, emodin, aloe-emodin, emodin monomethyl ether, and chrysophanic acid ; dextrose ; lævulose ;

tannin; and an amorphous, non-glucosidic resin. This resin, on hydrolysis, gave small amounts of gallic and cinnamic acids, rhein, emodin, aloe-emodin, emodin monomethyl ether, and chrysophanic acid, together with a new compound, $C_{14}H_{12}O_3$, m.p. 256°, which is probably a trihydroxydihydrocanthracene. The portion of the extract undissolved by water yielded a trace of a hydrocarbon, m.p. 64; a phytosterol (verosterol), $C_{27}H_{46}O$; a mixture of fatty acids, consisting of palmitic, stearic, oleic, linolic, and linolenic acids, both free and combined; rhein; rheinolic acid; emodin; aloe-emodin; emodin monomethyl ether; chrysophanic acid; and a trace of a substance which did not fuse at 340°C., but yielded an acetyl derivative, melting at 335C. It also gave some amorphous products, and a further quantity of the crystalline mixture of the glucosides of the anthraquinone derivatives. Of the anthraquinone derivatives, only aloe-emodin and chrysophanic acid had any purgative action, the mixture of glucosides being quite inert. The chief purgative principle is the above-mentioned non-glucosidic resin. (See also *Y.B.*, **1904,** 146, 156; **1907,** 119, 136; **1908,** 169.)

Xanthoxylum ochroxylum, Constituents of. M. Leprince. (*Bull. Sci. pharmacol.*, 1911, **18,** 343.) The shrub is indigenous to the country round Maracaibo, and is found all over Central America. It belongs to the N.O. *Rutaceæ*, and is known as "Bosuga blanca." The bark is stated to be used for dental affections and eye diseases. In Venezuela it is applied as a local anæsthetic. The author finds that the drug contains two alkaloids, *α*-xantherine and *β*-xantherine, which appear to be allied to berberine; a neutral crystalline substance, *α*-xanthoxyllin, and another neutral substance, also crystalline, *β*-xanthoxyllin, and a mixture of essential oil and fat which is very abundant. *α*-Xantherine is the most abundant alkaloid. The alkaloids are extracted by C_6H_6, redissolved in Et_2O, liberated by NaOH and converted into hydrochlorides with HCl. They are then separated by fractional crystallization; *α*-xantherine crystallizes from C_6H_6 in needles, having the formula $C_{24}H_{23}NO_6$, m.p. 186–187°C. *β*-xantherine differs from the above in m.p., and in the much greater solubility of its hydrochloride. The two bases together only exist to the extent of 3 : 10.000 of the drug. The oily substance obtained by treatment with petroleum ether is yellow, and has a characteristic sharp pungent astringent, anæsthetic taste and a fresh odour. It does not distil without

decomposition at ordinary temperatures. Only a portion is saponifiable. In a few weeks it sets to a waxy mass and a portion is then insoluble in petroleum ether. This oil constitutes about 6 per cent. of the drug and contains the anæsthetic substance. It appears to act on the bulbomedullar system, but in a less intense manner than local anæsthetics. It is an analgesic rather than an anæsthetic. *a*-Xantherin, although devoid of any anæsthetic action, exerts a paralysant action on the intracardiac nervous system.

Withania somnifera, Constituents of. F. B. Power and A. H. Salway. (*Proc. Chem. Soc.*, 1911, **27**, 83.) The material employed represented the entire solanaceous plant obtained directly from South Africa. Both the roots and the terrestrial portions of the plant gave evidence of alkaloid, and they were separately examined.

The investigation has shown that a number of substances present in the root are likewise contained in the leaves and stems of the plant. These substances, besides small amounts of an essential oil, and a sugar yielding *d*-phenylglucosazone, were: Hentriacontane, $C_{31}H_{64}$; a phytosterol, $C_{27}H_{46}O$; palmitic, stearic, cerotic, oleic, and linolic acids; and ipuranol, $C_{23}H_{38}O_2(OH)_2$. From the root there were obtained, furthermore, a new monohydric alcohol, withaniol, $C_{25}H_{33}O_4{\cdot}OH$, decomposing at 305°, and having $[a]_D + 91{\cdot}2°$; and an amorphous alkaloidal principle, which, on treatment with alkali hydroxides, yielded a crystalline base, $C_{12}H_{16}N_2$, m.p. 116°. The leaves and stems yielded the following new compounds: A monohydric alcohol, somnirol, $C_{32}H_{43}O_6{\cdot}OH$, decomposing at 205°, and having $[a]_D + 34{\cdot}8°$; a dihydric alcohol, somnitol, $C_{33}H_{44}O_5(OH)_2$, decomposing at about 250°C. and having $[a]_D + 21{\cdot}2°$; and an acidic hydrolytic product, withanic acid, $C_{29}H_{45}O_6{\cdot}CO_2H$, m.p. 226°, the methyl ester of which decomposed at 255°.

Withania somnifera contains no mydriatic alkaloid, and physiological tests, conducted on a dog, failed to confirm the sedative or hypnotic properties attributed to it.

MATERIA MEDICA

NEW REMEDIES

Abanone, Magnesium Phosphotartrate. (*Ann. de Pharm.*, 1911, **61.**) Prepared by the action of magnesium acid tartrate on magnesium phosphate, or by the action of phosphoric acid on the neutral tartrate. It occurs as a white, crystalline, almost tasteless powder, slightly soluble in water. It is used as a purgative in doses of a teaspoonful.

Achibromin and Achi-iodin. (*Pharm. Zeit.*, 1911, **56,** 362.) Achibromin is stated to be monobromoisovalerianglycol-urea, containing, theoretically, 28·5 per cent. of bromine. Achi-iodine is the analogous iodine compound.

Adaline (*Pharm. Post*, 1911, **44,** 84) is bromo-diethyl-acetyl-urea; a colourless, almost tasteless powder. Sparingly soluble in cold water. Readily soluble in alcohol. Employed as a sedative in doses of 5 to 15 grains, three times daily.

Afridol and Afridol Soap. W. Sceauth and W. Schoeller. (*Apoth. Zeit.*, 1910, **25,** 695.) Afridol, sodium-oxymercuric ortho-toluate, is not decomposed by alkalies. It is therefore claimed to be specially suitable for the preparation of a mercurial antiseptic soap, for sterilizing the hands, instruments, and for other purposes. The mercury present does not in the least affect metal. Its solutions are preferable to those of lysol, and are odourless; and as they are neither caustic nor irritant, they may be applied in cases of skin diseases or for affections of the scalp. The soap is prepared with 4 per cent. of afridol.

Allyl Cinnamate. F. Goldmann. (*Berichte Pharm.*, 1911, **21,** 33.) A yellowish strongly aromatic liquid, which on prolonged warming becomes polymerized to a resin. This has all the physical and chemical properties of the resin of Peruvian balsam. It is used locally as an application in tubercular affections.

Almatein. (*Merck's Report*, 1910, **23,** 101.) R. Werndorff has found almatein (*Y.B.*, **1909,** 99) to be a valuable substitute for iodoform for tuberculous lesions. It may be used either as a 1 : 10 powder, or gauze. It is specially useful for tuberculous fistulæ and for moist eczemas, since it has remarkable drying properties. Bed-sores are readily cured by its use. It has been given internally for acute and chronic intestinal catarrh in doses of 7½ to 15 grains every 4 hours.

Anodyne. (*Pharm. Zeit.*, 1910, **55,** 990.) This is stated to be a phenoxypropanediol, $C_6H_5OCH_2CHOH - CH_2OH$, obtained by heating phenoxy-propane oxide with water, under pressure. White, very soluble needles, b.p. 200°C. under 22 mm. Used to relieve pain of all kinds. Non-toxic, may be given in considerable doses. Best administered in tablets containing 8 grains each : three or four of these may be taken in 24 hours.

Anogon (*Pharm. Zeit.*, 1911, **56,** 129) is mercury di-iodo-para-phenol sulphonate, $C_6H_2I_2{\cdot}OHg{\cdot}SO_3Hg$. It is a pale yellow, insoluble powder claimed to be antiseptic and anti-syphilitic. For the latter purpose a 1 : 10 oily suspension may be administered by intramuscular injection.

Antirheumol. K. Ganz. (*Nouveaux Remèdes*, 1910, **27,** 540.) Is a solution of glyceryl salicylate in a mixture of alcohol and glycerin. It is applied locally, on dressings, over the affected parts, which are then covered with a bandage. The remedy is said to be very penetrating, and quickly lessens the pain of rheumatic affections.

Antituman (*Pharm. Zeit.*, 1910, **55,** 810) is a 2·5 solution of sodium chondroitinsulphonate, $Na_2C_{18}H_{25}NSO_{17}$, obtained from the chondromucoid of cartilage. It is a neutral, yellowish powder, very soluble in water ; the strong solutions have the consistence of mucilage. The 1 : 40 aqueous solution gives a precipitate with acetic acid after adding gelatin solution ; but not with egg albumin solution. After boiling with alkali the solution does not reduce Fehling's reagent ; but if it be first boiled with hydrochloric acid, and then neutralized, it does so. For therapeutic use, antituman solution consists of : Sodium chondroitinsulphonate, 0·01 Gm. ; Beta-eucaine, 0·01 Gm. ; distilled water to 4 c.c.

Atophan. W. Wientraud. (*Apoth. Zeit.*, 1911, **26,**

234.) The trade name for 2-phenyl-quinoline-4-carbonic acid. A gout remedy and uric acid eliminant. Dose, 8 grains every 3 hours, to 16 grains thrice daily. Alkalies sufficient to neutralize, or render alkaline, the urine may be simultaneously administered, if necessary. To be given in cachets, on account of sour taste.

Asclerosin. (*Merck's Report*, 1910, **23,** 126.) This name is given to a combination of salts, in tablet form, suggested by Truneczek's successful use of physiological salt solution for the treatment of arterio-sclerosis.

Asferryl (*Merck's Report*, 1910, **23,** 127) is stated to be iron arsenio-tartrate. It is a greenish yellow powder sparingly soluble in water, readily dissolved by dilute alkalies. It contains 18 per cent. of Fe and 23 per cent. of As. It is claimed that it permits of the administration of relatively large doses of arsenic without the appearance of toxic symptoms. Bachen states that it is 35 times less toxic than As_2O_3.

Benzonaphthol as an Intestinal Antiseptic. (*Merck's Report*, 1910, **23,** 142.) Benzonaphthol is an excellent intestinal antiseptic. It is specially useful for chronic intestinal cattarrh, chronic dysentery, and colitis. It is best prescribed in a compound powder thus: Bismuth subnitrate, 5 grains; benzonaphthol, $\frac{3}{4}$ grain; Dover's powder, $\frac{1}{12}$ grain; sugar, $1\frac{1}{2}$ grains. Children may take five a day, one every 3 hours.

Bromo-diethylacetylurea. (*Apoth. Zeit.*, 1910, **55,** 885.) This has been introduced as a nervous sedative with slight hypnotic properties. The dose is 8 grains, but as much as 45 grains may be given in 24 hours, without harm. It is a white almost tasteless crystalline powder, m.p. 115–116°C., sparingly soluble in water.

Citrospirine. (*Pharm. Zentralh.*, 1911, **52,** 169) is a compound of acetosalicylic acid and caffeine citrate. For influenza, and other febrile conditions, as well as for headache and muscular pain, it is administered in the form of tablets.

Credargan. (*Pharm. Zeit.*, 1910, **55,** 714.) This name is applied to an improved form of colloidal silver. Credargan is free from the albumin or peptone which was formerly combined with colloidal silver.

Cresosteril. E. Bierotte. (*Hygien. Rundsch.*, 1910, 1041; *Nouveaux Remèdes*, 1911, **28,** 84.) This is stated to be meta-cresyl ortho-oxalate; m.p. 54°C., readily split up into its constituents on contact with water. It is a very active germicide; its use for sterilizing instruments is suggested, but it is not found to be sufficiently intense for this purpose. As its toxicity is low, it is useful as a general antiseptic.

Cycloform as a Local Anæsthetic. R. Werner. (*Muench. Med. Woch.*; *Nouveaux Remèdes*, 1910, **27,** 536.) This compound, isobutyl para-aminobenzoate, is a white crystalline powder, almost insoluble in water, soluble in alcohol and in ether; it has a very feeble toxicity. It acts as a drying agent on wounds and has a prompt and powerful anæsthetic action, which is strictly local and superficial. No symptoms of intolerance were observed, even when the cycloform was applied in quantities of several Gm. daily, for weeks, to extensive wounds. Cessation of pain is apparent in a few minutes after its application in the form of powder and more slowly when it is applied in the following ointment: Cycloform, 32·5; naftalan, 225; anhydrous lanoline, 175; olive oil, 97·5; zinc oxide, 100; boric acid, 50.

Diglycodisalicylic Acid. (*Apoth. Zeit.*, 1910, **25,** 1003.) This compound, $O(CH_2{\cdot}COOC_6H_9{\cdot}COOH)_2$, is stated to possess the full physiological activity of salicylic acid, and has certain advantages over acetyl-salicylic acid for therapeutic use. It forms shining, odourless leaflets, with a faint acid taste, m.p. 168–170°C. A solution of salicylic acid, 13·8, in benzol, 200, is heated for several hours under a reflux condenser with diglycol anhydride, 5·8, benzol 25, and about 1 c.c. of pyridine. Another 5·8 of the anhydride is then added with 20 of benzol and a little more pyridine, and the mixture is boiled for several hours. The cooled product is filtered, washed first with dilute hydrochloric acid, then with water, and quickly recrystallised from a mixture of alcohol and benzol. This process is the subject of a German patent.

Di-iodo-tyrosine for Medicinal Use. A. Berthelot. (*Comptes rend.*, 1911, **152,** 1323.) Since 3·5-di-iodo-lævo-tyrosine is closely allied to the natural iodalbuminoids, it may be administered in large doses without producing ill effects. It is pro-

bable, however, that the desired therapeutic action of iodine may be obtained by the use of very much smaller doses than those at present given, when it is administered in this form. So that, although harmless, very large doses may not be necessary. Its use is suggested for all cases for which iodine is indicated.

Dipropæsine. (*Merck's Report*, 1910, **23,** 189.) This consists of two mols. of para-amido-benzoic propyl ester, united by a CO group, thus—

$$CO\begin{matrix}NH\cdot C_6H_4\cdot COOC_3H_7\\ NH\cdot C_6H_4\cdot COOC_3H_7\end{matrix}$$

It is a white, crystalline, tasteless powder, m.p. 171–172°C., insoluble in water, soluble in alcohol. Administered therefore in tablets, powder, or suspension. Dose as an analgesic, 7½ grains.

Erdol. (*Pharm. Zentralh.*, 1911, **52,** 542.) Prunier applies this name to quinoline salicylate. It is put up in capsules of 4 grains each. Adults may take two to four, children one capsule, a day.

Erseol (*Pharm. Zentralh.*, 1911, **52,** 36) is quinolinsulphosalicylate, $C_6H_3SO_3H\text{–}OH\text{–}COOH = C_9H_7N + H_2O$, a crystalline glossy, faintly acid, powder, sparingly soluble in cold water, readily soluble in slightly acid liquids. Prescribed for rheumatism, neuralgia, and influenza in capsules containing 4 grains. Adults may take two to four of these, and children one to two during meals.

Eutectan. (*Pharm. Zeit.*, 1910, **55,** 598.) A dark brown slightly aromatic insoluble powder; apparently an acid combination of Bi and guaiacol. Used as a general disinfectant: externally for wounds of all kinds in the form of dusting powder or ointment. As a 2 per cent. suspension, it is employed for gonorrhœa. Internally, it is given in doses of 3 to 16 grains for catarrhal affections, both of digestive tract and of the respiratory organs.

Eustenine. R. Uhlirz. (*Nouveaux Remèdes*, 1910, **27,** 416.) Is stated to be a double salt of theobromine sodium and sodium iodide, $C_7H_7N_4O_2Na\cdot NaI$, occurring as finely crystalline, hygroscopic, bitter powder useful in alleviating the symptoms of arteriosclerosis.

Fermentin, a Yeast Preparation for Dermatological Use. — Dreuw. (*Monats. prakt. derm.*, 1911, 349; *Apoth. Zeit.*, 1911, **26,** 303.) Fermentin is a microscopically fine powder prepared from yeast protoplasm and nuclei. It is used either alone, or combined with almost any active drug, or inert diluent or vehicle, in all kinds of dermatological applications. It is useful as a cosmetic powder for acne, eczema, folliculitis and seborrhœa. Fermentin may be combined with a superfatted soap basis for use in certain conditions of the skin, and it forms a useful addition to Unna's *Pulvis cuticolor* (*Y.B.*, **1908,** 305). The yeast-like odour may be covered, if desired, with a little bergamot oil or other perfume. Internally it is administered combined with iron or arsenic in tablet form, for anæmia; and with phenolphthalein, for constipation.

Ferrabol (*Merck's Report*, 1910, **23,** 201) is a new albumin iron compound, stated to contain 3 per cent. of Fe and 1 per cent. of lecithin. It is prepared as a chocolate tablet and is found by Levy to be very active in cases of anæmia.

Formicin (*Pharm. Prac.*, 1910, 281) is formaldehyde-acetamide. It is a syrupy, yellowish liquid, sp. gr. 1·14 to 1·15; b.p. with decomposition, about 115° to 120°. It has a characteristic odour, and a slightly acid and faintly bitter taste; soluble in water, EtOH, glycerin, and $CHCl_3$; slightly soluble in Et_2O. It gives off formaldehyde when heated.

Galegol. Scherer. (*Nouveaux Remèdes*, 1910, **27,** 538.) This name has been given to granules prepared by evaporating extract of galega *in vacuo* and granulating the product. Each teaspoonful of the granules contains 7½ grains of extract. From 2 to 8 teaspoonfuls are given daily. It is claimed to be a powerful galactagogue.

Geotalose. — Bottcher. (*Nouveaux Remèdes*, 1910, **27,** 299.) Geotalose is a compound of creosotal with a mucocolloid basis. When the vessel containing it is stood in boiling water, it melts to a syrupy, almost odourless and tasteless fluid, which is a valuable remedy for infantile diarrhœa. It may be given, in this condition, to infants in doses of 1 teaspoonful every hour, all food being meanwhile stopped. It is also useful for adult enteritis.

Hedonal for producing Total Anæsthesia. A. P. Jeremitsch and S. P. Fèderow. (*Nouveaux Remèdes*, 1910, **27**, 530.) A 1·45 : 100 solution of hedonal in physiological salt solution has been employed, by intravenous injection, as a means of producing general narcosis. The injection is made into a vein at the elbow, from 200 to 300 c.c. of the solution being used ; the narcosis produced by this is maintained by fresh injections of 50 to 100 c.c. In most cases narcosis has been complete in 3 to 8 minutes after the first injection, and, as a rule, 6 to 8 Gm. of hedonal thus given produce total unconsciousness for an hour. As much as 11·4 Gm. has been given, which prolonged the narcosis for 2 hours 52 minutes. In no case were any complications observed. Even in grave operations on weak patients cardiac tonics were unnecessary. The amount of injection used varied from 250 to 500 c.c. No discomfort and no vomiting follow the administration. Venous thrombosis sometimes occurs in weak subjects. In two out of forty-five cases some preliminary excitement was observed.

Hexamethylenetetramine-Guaiacol. (*J. Pharm. Chim.*, 1910, **2**, 67.) This compound is obtained by adding guaiacol to a strong solution of hexame thylene-tetramine ; or by adding formaldehyde solution to solution of guaiacol in AmOH, and heating the mixture, in either case. On cooling, the compound separates in long brilliant needles. It is claimed to be a general substitute for guaiacol, and to be more convenient for use.

Hetraline, Formamine-Resorcinol. G. Mossler. (*Zeits. allgem. Oesterr. Apoth. Verein* ; *Phar. J.*, 1910, **31**, 235.) Hetraline is obtained by mixing strong solutions of resorcinol and hexamethylene-tetramine in equimolecular proportions. On standing hetraline separates out in colourless or slightly reddish crystals ; solubility in cold water, 1 : 14 ; in hot water, 1 : 4 ; sparingly soluble in $CHCl_3$; almost insoluble in Et_2O. Aqueous solutions are faintly alkaline and turn brown on keeping. Hetraline should yield 44 per cent. of resorcinol when dissolved in water, acidified with H_2SO_4 and shaken out with Et_2O. It must be kept in the dark.

Hydropyrine (*Pharm. Zentralh.*, 1911, **52**, 169) is lithium acetyl-salicylate. It is a white, odourless crystalline powder, soluble in water.

Isobutyl Para-amido-benzoate. (*Apoth. Zeit.*, 1910, **25,** 488.) This ester is a local anæsthetic and antiseptic. It occurs as a yellowish, neutral powder, very insoluble in water; m.p. 64 to 65°C. It is best applied in the form of a 5 or 10 per cent. ointment. The former is prepared by dissolving powder in the soft paraffin at 40–50°C. The latter strength requires the ester to be dissolved with heat in twice its weight of olive oil and then incorporated with soft paraffin. It may also be used as a dusting powder. It is useful as an application to burns, fissures of the mammæ or anus, and also for producing anæsthesia of the nasal and pharangeal mucous membrane, and for general application to painful wounds.

Limonene as a Substitute for Oil of Turpentine. Zickgraf. (*Muench. Med. Woch.*, 1910, 1070; *Nouveaux Remèdes*, 1910, **27,** 529.) Limonene is superior to oil of turpentine for the treatment of all cases in which the latter is indicated. It exerts a powerful antisecretory action in fetid and chronic bronchitis. Doses of 10 to 30 drops, three times a day, have not been found to exert any harmful action on the kidneys. Lately the synthetic limonene obtained as a by-product in the manufacture of artificial camphor has been thus administered. It also acts as a powerful stomachic antiseptic.

Lysochlor. E. Konrad. (*Nouveaux Remèdes*, 1911, **28,** 93.) Meta-cresol chloride is known by this trade name. It is a powerful bactericide, suitable for sterilizing the skin in combination with soap. Its alcoholic or acetone solutions are yet more active.

Medinal for Sea-sickness. L. Pauli. (*Berl. Klin. Woch.*, 1910, 11; *Nouveaux Remèdes*, 1910, **27,** 507.) Medinal, taken as soon as any feeling of discomfort is perceived, in doses of 4 to 8 grains, has proved to be an excellent and prompt remedy for sea-sickness. Even when taken after the vomiting has set in, it acts with efficacy; but then, the dose of 4 grains may have to be repeated three or four times.

Mensan (*Merck's Report*, 1910, **23,** 256) is stated to be a fluid extract of de-fatted hazel nuts. It is stated to be a uterine tonic and has been prescribed for uterine hæmorrhage due to chronic endometritis. It is also hæmostatic and sedative. The dose is a tablespoonful twice daily.

Mercurial Remedy for Syphilis, New. F. Blumenthal. (*Biochem. Zeits.*, 1911, **32,** 59; *Apoth. Zeit.*, 1911, **26,** 292.) Sodium diamino-diphenyl-mercuridicarbonate is stated to be less toxic than most of the recently introduced organic mercurial compounds, yet to act as a marked spirillocide.

Meriodin. R. Polland. (*Nouveaux Remèdes*, 1910, **27,** 539.) This is stated to be mercury di-iodo-paraphenolsulphonate, an anti-syphilitic, put up in tablets containing 0·0083 Gm., each equivalent to 0·0025 Gm. of Hg. At first two or three tablets are given daily; then five to six. No indications of mercurial poisoning have been observed. A number of successful cases with recent and tertiary syphilis have been recorded, without any relapses after four months. (See also p. 210.)

Neopyrine. (*Apoth. Zeit.*, 1910, **25,** 1010.) A new antipyretic, phenyl-dimethyl-isovalery lamidopyrazolone; an antipyrine derivative claimed to be less toxic than the original phenazone. It forms white, almost odourless crystals, with a slightly bitter taste.

Novocaine Bicarbonate as a Local Anæsthetic. A. Läwen. (*Apoth. Zeit.*, 1910, **25,** 787.) Bicarbonates of some local anæsthetics have a stronger and more prolonged anæsthetic action than the chlorides of the respective bases. The author prepares the following preparations: (1) *Novocaine Bicarbonate Solution, 2 per cent.:* Sodium bicarbonate, pure, 0·15; sodium chloride, 0·10; novocaine hydrochloride, 0·60; distilled water, 30. (2) *Solution of* 1½ *per cent.:* Sodium bicarbonate, 0·20; sodium chloride, 0·20; novocaine hydrochloride, 0·75; distilled water, 50. (3) *Solution of* 1 *per cent.:* Sodium bicarbonate, 0·25; sodium chloride, 0·50; novocaine hydrochloride, 1·00; distilled water, 100. (4) *Solution of* ½ *per cent.:* Sodium bicarbonate, 0·15; sodium chloride, 0·50; novocaine hydrochloride, 0·50; distilled water, 100.

Olintal. — Schenk. (*Apoth. Zeit.*, 1910, **25,** 743.) This is described as liquid soap, containing 2·8 per cent. of myrrh, 0·5 per cent. of camphor and 0·5 per cent. of menthol; soluble in water, it is used in inhalations or gargles. It is also given internally for tuberculosis and pneumonia. The dose for adults is up to 4 teaspoonfuls a day: for infants, from 20 to 50 drops.

Passiflora alata, Medicinal Value of. Peckholt. (*Gehe's Report*, 1911; *Apoth. Zeit.*, 1911, **26,** 335.) The ripe fruit when eaten to excess is stated to occasion slight drunkenness and drowsiness. When pulped it forms a healing cataplasm for cancerous sores. An infusion of the leaves 15 : 100, or a fluid extract, is used for bronchial asthma. Small doses of the root are emmenagogue; in larger doses, emetic. In excessive quantity it is toxic.

Pellotine Hydrochloride. (*Apoth. Zeit.*, 1910, **25,** 550.) This salt of the alkaloid, $C_{13}H_{19}NO_3HCl$, derived from the cactus *Anhalonium williamsi*, is now obtainable in commerce and is introduced as a hypnotic. It occurs in colourless prisms, very soluble in water. Its aqueous solutions give a blue colour with Fe_2Cl_6. The normal dose is $\frac{1}{3}$ grain, but 1 grain may be given. Hypodermically the dose should not exceed $\frac{1}{3}$ grain at first. Sometimes a dose of 7 grains of veronal may be given, followed later by $\frac{1}{3}$ grain of pellotine hydrochloride.

Periplocin as a Digitalis Substitute. L. A. Silberberg. (*Apoth. Zeit.*, 1911, **26,** 319.) The glucoside of *Periploca græca* is recommended for intravenous injection for heart disease, as a substitute for digitalis. The dose is *one milligramme* in the following solution: Periplocin, 10 *milligrammes*; NaCl, 0·6 Gm.; distilled water to make 10 c.c. Dissolve and sterilize. One c.c. for an intravenous injection.

Resosalyl, a New Soluble Antiseptic. D. Monteil. (*Nouveaux Remèdes*, 1910, **27,** 537.) Resorcinol, 22·2 Gm.; KOH, 11·2 Gm., are melted together over a gentle flame in a capacious tared porcelain dish. Sodium sulphovinate, 33·2 Gm.; and salicylic acid, 27·6 Gm., are added, the heat being continued until complete fusion results, when camphor, 25 Gm., is added. Then boric acid, 20 Gm.; borax, 60 Gm.; benzoic acid, 25 Gm.; terpin hydrate, in fine powder, 8 Gm., sodium benzoate, 15 Gm.; glycerin, 200 Gm.; and water, 200 Gm., are added. The mixture is heated to 80°C. on the water-bath to complete solution, and filtered bright through cotton wool. The solution is odourless, and miscible with water.

Silver and Platinum Amalgams for Medicinal Use. (*Merck's Report*, 1910, **23,** 103.) The medicinal employment of the colloidal metals suggested to Queyrat the use of Ag–Hg and Pt–Hg

amalgams instead of the usual "grey oil" for injection for the treatment of syphilis. The silver amalgam is suspended with lanolin or liquid paraffin so as to contain Hg in the proportion of 40 : 100. Of this 0·07 c.c. was injected every week. It is said to have been successful where grey oil had failed. In the case of Pt an amalgam of Pt, 10, with Hg, 90, was used in the same way. It is said that these amalgams are less toxic than the equivalent Hg suspensions.

Substitol. (*Merck's Report*, 1910, **23,** 97.) This is stated to be a prepared fibrin obtained from blood after removing the serum and blood corpuscles. It is applied to stimulate healing in sluggish wounds, by stimulating leucotaxis. It is specially useful for burns, and to aid the growth of transplanted tissue. It is applied to the wound surface as a powder in a thin, uniform layer. In deeper lesions, an emulsion of substitol may be injected by means of a cannula. Lupus is favourably influenced by subcutaneous injections of the emulsion.

Sulphoform. Joseph. (*Apoth. Zeit.*, 1911, **26,** 46, 75, 260.) This is triphenylstibine, $(C_6H_5)_3SbS$, a compound which is easily decomposed, liberating S and possessing marked reducing properties. It is introduced as a remedy for skin diseases, especially for seborrhœic alopecia. It is used in frictions to the scalp, in the form of 1 : 20 to 1 : 5 ointments with soft paraffin bases, or as a 1 : 10 suspension in olive oil.

Theophylline-Piperazine Compound, Soluble in Water. (*Apoth. Zeit.*, 1910, **25,** 948.) A German patent has been taken out for the preparation of a water-soluble theophylline-piperazine compound, for which marked therapeutic activity is claimed. A little more than two molecular weights, 146 Gm., of piperazine is melted on the water-bath ; 198 Gm. of theophylline is then added, when solution results. On cooling the combination separates in a crystalline condition. It is dried, *in vacuo*, at the ordinary temperature. Similar compounds may be obtained with other diamines instead of piperazine ; such as ethylene-diamine, hexamethylene-diamine, and lysidine.

Ureoquinine (*Pharm. Zentralh.*, 1911, **52,** 169) is quinine hydrochlorocarbamide, obtained in small crystals by adding pure urea to a solution of quinine hydrochloride in HCl, filtering

and crystallizing. Soluble 1 : 1 in water. Prescribed in 1 : 100 solution.

Vasotonine a Mixture. L. Spiegel. (*Therap. Monats.*, 1910, 365; *Pharm. Zentralh.*, 1910, **51,** 728.) Vasotonine is not, as claimed, a double salt (*Y.B.*, **1910,** 190) of urethane and yohimbine nitrate. Nor does it contain, as stated on the label, 10 Mgm. of yohimbine in each c.c. The author only found 8·5 Mgm. at the most.

PHARMACOGNOSY

Aletris farinosa Powder, Adulterated. (*Evans' Analyt. Notes*, **1910,** 7.) A specimen of powdered *Aletris* rhizome adulterated with wheat starch and powdered *Althea* root has been met with.

Aloes, Socotrine. (*Southall's Report*, **19,** 5.) Five samples have been examined during the year, and in no instance has the B.P. standard for solubility in cold water been reached, the actual figures ranging from 31·2 to 41·1 per cent., with an average value of 36·8 per cent. (See also *Y.B.*, **1908,** 12.)

Arrowroot, Queensland. (R. C. Cowley. (*Chem. and Drugg.*, 1910, **77,** 242.) Queensland arrowroot is derived from *Canna edulis*, and may therefore be considered a variety of tous-les-mois. The true *Maranta* arrowroot cannot be grown to perfection in Queensland; *Canna* var. have become wild plants in the gardens about Brisbane, and are somewhat troublesome to eradicate. *C. edulis* grows well in rich soils alongside creeks, especially in black forest or scrub soil, attaining a height of 8 feet, surmounted by a spike of rich red flowers 2 feet higher still. The rhizomes weigh from 1 to 2 lb. when ready for digging. The principal areas of cultivation are in South Queensland, between Brisbane and the New South Wales border, in the neighbourhood of Pimpama, Coomera, and Nerang Creeks. Last year 246 acres were under cultivation, from which there was a total production of 2,820 tons of arrowroot farina. As from other tuberous-rooted plants, the largest yield of farina is obtained after the mild winter frosts have set in, which send all the starch down into the underground portions. The plant flowers in May, and is ready for digging in August. The rhizomes are cut off, thoroughly washed, and raised by a lift to the grating-machine.

The pulp and farina are washed out into a circular trough provided with holes and pegs at different levels on its side. Here they are allowed to settle; the farina sinks to the bottom as a hard mass, and the pulp is removed from the top of the farina with a rake. The farina is washed about half-a-dozen times with water by subsidence, the water being drawn off by the holes in the sides of the tank. When thoroughly washed the farina is rubbed through a calico strainer by mechanical means, which separates it completely from the fibre. The solid farina is dug out of the receiver by means of wooden spades and spread in thin layers on calico drying-tables, and dried by exposure to the sun. The product is a perfectly white glistening farina which does not possess any tendency to cohere, showing absence of glutinous substances. It is a very pure form of starch.

The analytical results comparing Queensland and Bermuda arrowroots are given in the following table by the Queensland official chemist.

	Bermuda Arrowroot.		Queensland Arrowroot.	
	2*s.* 6½*d.* per lb.	1*s.* 1*d.* per lb.		
Moisture	13·5	15·86	17·36	17·28
Starch	82·24	82·61	81·52	81·87
Ash	0·124	0·172	0·142	0·295
Proteids	0·052	0·087	0·078	0·061
Fibre (by difference)	4·09	1·28	0·092	0·50

Bermuda arrowroot does not appear to possess any special flavour which gives it an advantage over the Queensland product, and the analysis of all samples shows that the Queensland product is freer from fibre than that from Bermuda.

Belladonna Leaves adulterated with Ailanthus Leaves. W. Mitlacher. (*Zeits. allgem. Oesterr. Verein.*, 1911 [19] *Pharm. Zeit.*, 1911, **56,** 486.) Some time back the author reported that the cut up leaves of *Ailanthus glandulosa* were being put on the market under the name of "Folia uso sennæ" for the purpose of adulterating senna leaves. The same firm who offered this, now puts forward a belladonna substitute. This proves to be the same leaf, that of *Ailanthus glandulosa*, as was offered as a sennæ surrogate. Now, however, it is entire but much crumpled. At

first glance the leaf is not unlike belladonna, but when floated out in water it is seen to be totally distinct, and are leaflets of a compound leaf. The micro-structure is quite different.

Benzoin, Siam. E. M. Holmes. (*Pharm. J.*, 1910 [4], **31,** 515.) H. Rordorf. (*Schweiz. Woch. Chem. Pharm.*, 1910, **48,** 549.) Holmes states that the difficulties of obtaining authentic botanical specimens of the tree producing Siam benzoin are very great, on account of the inaccessible region in which it grows. In 1883 he was able to show a twig of the tree sent from Singapore by R. Jamie, at the Southport Conference (*Y.B.*, **1883,** 534). The opinion was then expressed and is still held that Siam and Sumatra benzoin are produced by different species. Subsequently, Pierre presented to the museum of the Pharmaceutical Society, specimens from what was believed to be the Siam benzoin tree, but since then no material for the identification has been obtainable by the author.

Rordorf reports on some leaves sent over from Siam by Nieuwenhuiz. These are entire, whereas those of *Styrax benzoin* are serrate toothed. Moreover, the stellate hairs present are not identical with those found on *S. benzoin*.

Some interesting details with reference to the collection of the resin are given :—

On trunks of 20 Cm. to 25 Cm. in diameter pieces of bark of rectangular shape from half to four hands-breadth in size are loosened, and the resin runs out on the inner side of the bark, solidifying there by the heat of the sun. This forms the finest quality. The smaller fragments are formed into lumps by hand. The resin is spread out on a strong mat in a heap, and ginger roots, first hollowed and filled with the marrow of the bones of the pig, are mixed with it, and the mats are tied up at the ends into a bundle. The contents are examined from time to time to see if the fat has been taken up, and if not, fresh fat is added. It is said that rancid pork fat will not, like fresh fat, pass through the ginger root. This process takes about one year, its object being to give a fine aroma. When the fat has disappeared from the ginger the drug is ready for export, without risk of losing its fine odour through the hot and long journey to Bangkok.

Greenish is unable to find any difference in the microscopical appearance of the hairs of *Styrax benzoin* from Sumatra and those of the Siam plant.

Birch Tar Oil; Oleum rusci. C. T. Bennett (*Pharm. J.*, 1910 [4], **31,** 4); E. M. Holmes (*ibid*, 5). Considerable attention has been directed to this product in consequence of its being recommended in the daily press for the prevention of insect bites. The empyreumatic oil of birch bark from *Betula alba* has a number of synonyms. *Oleum Betulae albae*; *birch tar oil; oleum Rusci; Oleum rusci pyroligneum* and others. The derivation of the word "Rusci" has given rise to much speculation. It has no connexion with *Ruscus aculeatus*. The most probable explanation is that of T. Greenish, who first introduced the oil to the notice of English dermatologists. He regards the term as a corruption of "Russicum," the oil having been employed in medicine under the names of *Oleum Betulinum Russicum*, *Rusci*, *Muscovitum* and *Lithuanicum*. P. MacEwan reported on the characters of the oil in 1885 (*Y.B.*, **1885,** 213). Specimens recently examined by Bennett had the sp. gr. 0·944; contained 75·7 per cent. of non-saponifiable fatty bodies soluble in ether; 9·3 per cent. of saponifiable resins soluble in ether; and 15 per cent. of insoluble and volatile constituents. The crude, not the rectified oil, should be used for pharmaceutical purposes.

Bombax malabicum Gum. P. P. Phillips. (*J.S.C.I.*, 1911, **30,** 469.) The red silk-cotton tree, or semul, is indigenous to Ceylon, Burma, the Malay Peninsula and Northern Australia, and is found over the plains of India. The gum is formed from injuries to the bark. When it first exudes it is white and viscous. It soon turns red, and dries to a hard brittle mass or tears. It is known in the bazaars as Mocherus gum. Being very astringent, it has a wide application as an Indian domestic remedy. It contains a large quantity of a catechol tannin. A number of indefinite chemical reactions are enumerated. On hydrolysis with dilute mineral acids it affords a crimson product, semul red.

Buchu, New Adulterant of. E. M. Holmes. (*Pharm. J.*, 1910 [4], **31,** 69.) The author's attention was directed to a substituted parcel of buchu by H. Hymans, who had noticed that it contained leaves differing from the official buchus, being bitter and devoid of aroma. These leaves were traced to a species of *Psoralea*, probably *Psoralea obliqua*, which is common in the district which produces *Barosma betulina*. The leaflets may be distinguished from buchu leaves by the unequal lamina; a distinctive recurved apiculus; dark oil glands, more numerous

than those of buchu ; and a hairy surface. The bulbous bases of the peculiar elongated epithelial cells of these oil glands ; their polygonal terminal surfaces ; the character of the epidermal cells, without hesperidin ; the presence of scalariform vessels ; the position of the stomata as regards contiguous cells ; and the simple rough walled hairs, would serve to distinguish the admixture of powdered *Psoralea* with the genuine powdered drug.

Buchu Substitute. (*Chem. and Drugg.*, 1910, **77,** 17.) A recent (July, 1910) importation of a false buchu is recorded. The leaves are figured and the histological characters of a transverse section are shown.

Buchu Substitutes. E. M. Holmes. (*Pharm. J.*, 1910 [4], **31,** 464.) In addition to substitutes and adulterants previously described, the leaves of *Barosma eckloniana* and of the genuine *B. crenulata*, with which it has lately been mixed, are figured and compared. The chief macroscopical distinctive character of the false buchu is the absence of the apical oil gland ; the form of the apex is also quite distinctive. With reference to the *Psoralea* previously described as a buchu substitute, some doubt has been expressed as to the species. *P. polystica* and *P. bracteata* have been suggested as possible botanical sources. The author is still inclined to attribute the source to *P. obliqua*, but until flowers are obtained, this cannot be definitely settled.

Camphor Trees of Australia. R. T. Baker. (*Pharm. J.*, 1911 [4], **32,** 272.) In the *Cinnamoma*, Australia has a native source of camphor, for the yield from *C. oliveri* leaves alone is high, and the timber also contains camphor. The bark of this tree yields an oil, the commercial value of which is yet to be tested. *C. laubatii*, at present a little known species, gives indications of yielding products equal to those of *C. oliveri*, and the same remarks apply to the other species mentioned in the paper. As the result of this investigation the cultivation of these trees as oil and camphor yielders has already been started on the North Coast.

Cantharides, Microscopical Characters of the Powdered Drug. F. Netolitzki. (*Zeits. allgem. oest. Apoth. Ver.*, 1911, **49,** 220.) A method of preparing the powdered drug is given, and the characteristic appearance of the chitinous parts of the beetle

is described. The distinctive microscopical characters of the oil beetle, *Meloe*; the musk beetle, *Aromia*; the rosechafer, *Cetonia aurata*; and of *Hoplia farinosa*, are also described.

Cicuta virosa as a Cattle Poison. E. M. Holmes. (*Pharm. J.*, 1911 [4], **32**, 430.) A number of cattle having been poisoned in Ireland by eating the roots of this virulently toxic umbellifer, these roots are figured and described. They are provided with air chambers, which enables them to float when they become detached from the parent plant, as in flood time, and thus reach spots where grazing cattle can obtain them. As they have a sweetish taste they appear to be attractive to stock. The distinctive points between *Cicuta virosa* and the equally poisonous *Œnanthe crocata* are detailed. A chemical analysis both of the roots and of the fruits of the plant is required.

Coca, Botanical Nomenclature of the Species producing the Drug. E. M. Holmes. (*Pharm. J.*, 1910 [4], **31**, 736.) From a flowering specimen of Rusby's *Erythroxylon truxillense*, received from that authority, the author has been able to reinvestigate the intricate and confused nomenclature of the cocas. It is considered well that Rusby's name, *E. truxillense*, should be retained for the Truxillo drug, but it should not be regarded as identical with the *E. spruceanum* of Burck. It seems probable that the *E. spruceanum* of Burck is the long-styled form of the plant of which Rusby's *E. truxillense* is the short-styled form. Of the Huanuco or Bolivian coca there appear also to be two forms—viz., the *E. coca* of Lamarck, which Hooker figures with short styles, and the *E. bolivianum* of Burck, which has long styles. Except in so far as these forms of the two plants may differ in habit of growth, or in the proportions of chemical constituents, it is hardly necessary that they should be held as distinct, or receive a definite name. The name, *E. coca*, Lamarck, for the Bolivian drug, and that of *E. truxillense*, Rusby, for the Peruvian one, will therefore answer all practical purposes.

Coca Leaves, Production and Use of. (*Bullet. Imp. Inst.*, 1910, **8**, 388.) The chief commercial sources of coca leaves at the present time are Peru, Java, and Ceylon. The quantity of leaves sent from Peru is approximately 2,240,000 lb.; in 1908 Java exported 1,026,022 lb.; and Ceylon 80,088 lb. In addition to the above Peru exports about 6,000 kilos of crude alkaloid,

chiefly to Germany, where it is purified. Javan leaves contain but little cocaine, as such, but are rich in allied bases, which are readily converted into that alkaloid. They are mainly exported to Holland and Germany for the manufacture of cocaine. It is now proposed to extract the crude alkaloids on the spot, and send these to Europe for purification. Ceylon leaves differ from Javan in containing cocaine. They are therefore better suited for galenical purposes. As they are better prepared they fetch a higher price. De Jong estimates the world-consumption of cocaine at the present time as 12,000 kilos per annum; and the yield per acre in Java at 6 kilos of pure cocaine per acre. Coca is recommended as a catch crop on rubber plantations.

Convolvulaceous Plants, Brazilian, Medicinal. T. Peckolt. (*Berichte Pharm.*, 1910, **20,** 481.) The tubers and resin of *Operculus convolvulus* are used as a purgative, and the starch of the former is also officinal, being employed as a mild laxative for children. The powdered tuber is given in doses of 30 to 60 grains, as a substitute for jalap, and the resin in doses of 18 to 20 grains. The dried wild tubers contain 10·27 per cent. of resin, and the cultivated plants less. The resin contains 1·67 per cent. of a "convolvulin"-like substance. The tubers of *Operculina altissima* and of *Ipomœa glabra* are similarly used. The seeds of *I. bona-nox* (*Calonycton speciosum*) are a popular remedy for snake-bite, and when roasted are used as a coffee substitute. They contain no glucoside nor alkaloid, but a small quantity of a crystalline organic acid, and of a crystalline resin. The fresh leaves and stem, however, yielded a minute quantity of a crystalline glucoside, *ipomœin*, as well as amorphous bitter principle and two resin acids. The root bark contains rather more ipomœin. The decoction of the fresh stems and leaves is diuretic and aperient. Examination of *Ipomœa fistulosa* failed to reveal the presence of any active principle. The "sweet potato," *Ipomœa batatas*, is very widely cultivated as a food plant. The natives use *Cuscuta racemosa* as a remedy, but it appears, from analysis, without justification. The fresh plant gave 0·017 per cent. of cuscutin (?) and some resinoids and tannins.

Cubebs. (*Southall's Report*, **19,** 9.) Five samples examined proved to be very stalky in character and to give very indifferent results when extracted by petroleum ether, the percentages

obtained ranging from 4·66 to 8·78, with an average of 6·95. (See also *Y.B.*, **1910,** 195.)

Digitalis, Time for gathering the Drug, and Keeping Properties of the Tincture. J. G. Sharp and J. Lancaster. (*Pharm. J.*, 1911 [4], **32,** 102.) The restriction of the time of gathering the leaves to the flowering period is unnecessary. Active preparations may be made with first year's leaves, or with the leaves of the second year's plant, before flowers are produced. Tincture made from good active digitalis is found to retain its therapeutic potency for over 12 months. Deterioration is only apparent after 13 to 15 months. Dried leaves which have been kept for 8 years, and even 11 years, afforded tinctures of above the physiological standard. Concentrated liquid extracts have been found to be active, but when diluted with water, the last doses may cause violent vomiting and other toxic symptons. It has been suggested to kill the enzymes in the leaves with boiling alcohol, and then prepare galenical preparations therefrom. With an active tincture the dose of 5 to 15 minims is a good average. Some cases of idiosyncrasy towards digitalis have been met with, intolerance even to the smallest dose being shown. German commercial leaves, although much broken, produced an active tincture. The pharmacological standardization is performed by the authors with pithed frogs, by Martin's method (*Y.B.*, **1909,** 245).

Drug Assaying, Present Status of. L. F. Kebler. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 856.) As the result of co-operative investigation on the alkaloidal value of drugs, experience shows that the "personal equation" may influence the results, the percentage of variation falling within the following upper and lower limits with the bases or drugs enumerated. Atropine, brucine, morphine, strychnine, cocaine, nicotine, variation 2·5 per cent. of the recorded results. Ipecac, opium, jalap root, 5 per cent.; nux vomica, coca leaves, belladonna root, cinchona bark (total alkaloids), hydrastis, stramonium, guarana, kola, cinchona (ether-soluble alkaloids, colchicum, sanguinaria, 10 per cent. Aconite leaves and root, belladonna leaves, pilocarpus, conium, physostigma, 15 per cent.; hyoscyamus, 20 per cent. Elaborate tabular statements are given relating to the assay of opium by different methods, the results representing an enormous amount of work.

Drugs, Commercial Quality of, in the United States. (*Report of the Drug Market Committee, Amer. Pharm. Assoc.*; *Proc. Amer. Pharm. Assoc.*, 1910, **58,** 739.) *Extract of nux vomica*, labelled to contain 5 per cent. of strychnine, has been found to vary from 4·7 to 7·2 per cent. Extract of belladonna leaf, labelled to contain 0·3 per cent. of alkaloids, gave from 0·25 to 0·39 per cent. Convictions have been obtained against druggists for such simple solutions as tincture of iodine, liniment of camphor, spirit of peppermint and similar preparations, which have shown large deficiencies in the active ingredient. The suggestion of wilful fraud is not tenable; but the obvious carelessness in preparation is self-evident. Mercurial ointment has been retailed under strength, and conviction has followed, because the preparation had been allowed to stand in a warm place, so that partial separation had occurred. A parcel of "KBr" was distributed by one of the most prominent wholesale houses which contained 47·05 of KBr, 47·04 per cent. of NaBr, and 5·91 per cent. of NaCl. These figures indicate the necessity of individual analytical control of drugs by the pharmacist. A detailed list of the results obtained with a large number of drugs and galenicals are given.

Ergot, a Short Historical Study of. Gordon Sharp. (*Pharm. J.*, 1910 [4], **31,** 38, 68.) This resumé of the botany, chemistry, toxicology, pharmacology, and therapeutics of ergot is the introduction to an essay on the subject for which the author was awarded the Hunterian medal.

Gelsemium elegans the Source of the Chinese Drug Tai-tsa-ju. H. Solerenden. (*Archiv. Pharm.*, 1910, **248,** 658.) This is not a new drug, as supposed, but is traced to *Gelsemium elegans*. It contains two alkaloids which are very active in small doses, paralysing the respiratory system and causing death in a short time.

Grindelia camporum cultivated in Jersey. P. E. F. Perrédès. (*Pharm. J.*, 1910 [4], **31,** 388.) A further note on the habits and characteristics of these plants under cultivation, illustrated by photographs. (See also *Y.B.*, **1910,** 200.)

Henbane Seed in Russian Poppy Seed. A. Van Degen. (*Zeits. Untersuch. Nahr. Genusm.*, 1910, 705; *Apoth. Zeit.*, 1910, **25,** 944.) Cases of poisoning have recently occurred in

Hungary, due to the presence of henbane seeds in poppy seeds, which are employed for culinary purposes in Eastern Europe. These seeds were traced to Russian sources. Investigation then led to the extraordinary discovery that almost all samples of poppy seed from Russia contained an admixture of hyoscyamus seed. Of 170 samples examined, only 59 were free from this dangerous admixture, and these were mostly Hungarian, French, German, or Turkish seeds. In addition to containing henbane, the Russian samples were often grossly adulterated with earthy and saccharine matter, the latter being added to sweeten musty and rancid samples. The hyoscyamus seeds could be easily separated by passing the sample through a 0·9 mm. mesh, which retained all the henbane. [Bird fanciers and retailers of bird seed should examine their "maw" seed for this impurity, which might easily prove disastrous if given to cage birds.—Ed. *Y.B.*]

Irish Moss. (*Evans' Analyt. Notes*, **1910,** 37.) One selected sample gave 17 per cent. of ash, and contained $\frac{1}{7}$ grain of arsenic per pound.

An adulterated cheap sample of ground moss left 35 per cent. of ash, containing much $CaSO_4$; its gelatinizing value was about 60 per cent. below normal.

Jalap. (*Southall's Report*, 1911, **19,** 10.) Some difficulty is still found in securing supplies of this drug to comply with the official requirements, three samples out of the five examined being rejected on account of deficiency in resin. The results obtained were: Resin, 5·00 to 11·44 per cent.; average, 8·95 per cent.

Jalap Root. (*Evans' Analyt. Notes*, **1910,** 38.) The undried roots as received during the year have yielded from 6·5 to 11·7 per cent. of resin, or from 8 to 13·7 per cent. on the dry drug. (See also *Y.B.*, **1906,** 31; **1907,** 84; **1908,** 102.)

Ladanum or Labdanum. E. M. Holmes. (*Perf. Record*, 1911, **2,** 132.) An interesting account is given of this ancient perfume, which is a soft resinous secretion of *Cistus creticus*, a native of Crete and Cyprus. It collects on the hair of browsing goats, whence it is removed by the goatherds by combing; or is collected by passing a rake with strings over the bushy herb. Spanish ladanum obtained from *Cistus ladaniferus* is almost unknown commercially. The commerce in ladanum

has greatly fallen off in recent years. It has a peculiar sweet and very lasting perfume.

Lizards, Medicinal. D. Hooper. (*Pharm. J.*, 1910 [4], **31,** 668.) An interesting account of the dried lizards at present used in the East in domestic medicine, chiefly as reputed aphrodisiacs, and remedies for leprosy; also of the employment of various species in mediæval European medicine.

Mangrove Bark. H. Bocquillon. (*Repertoire*, 1911, **23,** 195.) Although mangrove bark is used in enormous quantities for tanning, its chief interest to pharmacists is on account of its reputed successful use as a remedy for leprosy. Many species are classed as "mangrove." The "red mangroves" used in medicine include *Rhizophora mangle*, *R. mucronata*, *Brugmera gymnorhiza*, *Coccoloba*, *uvifera*. The first three belong to the N.O. *Rhizophoraceae*; *Coccoloba* belongs to *Polygonaceae*. Grey mangroves belong to *Verbenaceae* and are furnished by the genus *Avicennia* and by *Conocarpus* of the N.O. *Combretaceae*. *Conocarpus erecta* and *Avicennia tomentosa* yield barks used medicinally. All these species are stated to agree closely in chemical constitution(?). The main constituent is about 20 per cent. of tannin; there is some glucoside, but no alkaloids. Mangrove bark is employed in all forms of liquid galenicals. The liquid extract is probably the most suitable, of which 5 Gm. is given twice daily, increasing up to 30 Gm. if required. For leprosy the solid extract is also given in doses of 2 to 8 Gm. Baths and lotions for external application are made from a 3 : 100 decoction. Improvement is said to be evident in 15 days, and a complete cure requires a year's treatment. If used early in the disease, cure is practically certain; of established cases 60 per cent. recover. When the disease is so advanced that the nervous system is affected, no benefit is derived from mangrove treatment. In addition to its use for leprosy, the bark is used as an astringent for diarrhœa, as a febrifuge, and as a remedy for tuberculosis.

Marjoram Leaves, Adulterated. E. Collin. (*Annales des Falsificat.*, 1911, **4,** 127.) The dried herb marjoram in coarse powder used for culinary purposes is often grossly adulterated in French commerce. The leaves of various species of *Cistus*, such as *C. albidus*, and the crushed leaves of the dogwood, *Cornus sanguinea*, are employed for this purpose. These may be detected

by boiling with a 1 : 20 solution of KOH by which true marjoram is not affected. The fragments of both these adulterants are, however, coloured greyish black to brownish black. The characteristic structure of the true marjoram leaf from *Origanum majorana* is described. This is totally different from that of the above adulterants, and also distinct from the so called garden marjoram, *O. vulgare*, which is often substituted for the true herb.

Maté and its Infusion. G. Bertrand and Devuyst. (*Nouveaux Remèdes*, 1910, **27**, 313.) Maté, the leaves of Ilex *paraguayensis*, is now being introduced into Europe as a means of producing a palatable caffeine-containing beverage. The samples that have previously been sent over have been of crude quality, roughly dried, and have given an unpalatable infusion. The properly prepared Maté yields a clear, fragrant infusion, which is very palatable. Analysis shows the presence of 2 per cent. of caffeine, 6 per cent. of sugars and 11 per cent. of tannin in the leaves. The method of infusion is found to remove all the important constituents of the leaves. The beverage maté, may be prepared in the following manner: A little boiling water, just sufficient to cover the leaves, is poured on them and they are allowed to macerate for a few minutes. Then the rest of the boiling water is poured on and the teapot is kept as hot as possible for 10 or 15 minutes. The infusion may be then drunk. About a teaspoonful of maté to a large teacupful of water; or, more precisely, about 10 Gm. to 1 litre, is the proportion to use.

Microsublimation as a Diagnostic Method for Drugs. O. Tunmann. (*Gehe's Report*, 1911; *Apoth., Zeit.*, 1911, **26**, 335.) *Gentian root.*—The characteristic crystalline sublimate of gentisin obtainable from 0·05 Gm. of powder, the residue from 0·8 Gm. of tincture and from 0·06 of coarse cuttings, is sufficient to identify the drug. Exhausted gentian gives no sublimate. *Asafetida* may be identified in a similar manner, by the microsublimate of ferulic acid. This method is applicable to the residue of tinctures and also to pill mass. The crystals may be identified by oxidizing them with strong $KMnO_4$; on warming they evolve a strong odour of vanilla: with phloroglucinol-hydrochloric acid they give a deep red colour.

Opium, Pharmacopœial Definition of. L. André and Leulier. (*J. Pharm. Chim.*, 1911, **3**, 162.) As the result of

practical experiments and the experience of other pharmacists it is suggested that the following definition of opium would be more satisfactory than that now given in the French Codex. "Officinal opium, dried at 100°C., should yield at least 12 per cent. of morphine; and not leave, on incineration, more than 7 per cent. of ash. It should, moreover, yield about 50 per cent. of aqueous extract: this should contain 18 per cent. of water, and not less than 20 per cent. of morphine."

Orris Root Powder, adulterated with Exhausted Orris. (*Schimmels' Report*, Oct., **1910,** 91.) A specimen of cheap powdered orris root has been examined and found to be adulterated with exhausted orris powder. This sample gave the following percentages: Ash, 2·1; ether extract, 1·5; compared with 3·1 to 3·4 per cent. of ash, and 3·7 to 3·4 per cent. of ether extract obtained from genuine powdered orris.

Pepper and its Adulterations. E. Collin. (*Annales des Falsific.*, 1910, **3,** 272.) A monograph on the histology of whole and ground pepper, and of its adulterants, with details for the microscopical examination of the same; illustrated with six excellent woodcuts.

Phlox ovata (P. Carolina), Histology of the Rhizome and Roots of. H. Kraemer. (*Proc. Amer. Pharm. Assoc.*, 1911, **58,** 999.) The rhizome of *Ruella ciliosa* occurring as an adulterant of Spigelia having being formerly examined and described as *Phlox carolina*, the microscopical characters of the true Carolina phlox are now figured and described.

Saffron and its Adulterants. E. Collin. (*Annales des Falsific.*, 1910, **3,** 354.) A profusely illustrated and complete description of the microscopy and histology of the pure drug and of its adulterants in the whole and powdered state. Among the adulterants enumerated, figured, and described are: The florets of *Carthamus tinctorius*; of *Cynara cardunculus*; of *Calendula officinalis*, known as "féminelle"; the flowers of *Lyperia crocea* or "Cape saffron"; maize stigmata; Tunisian capsicum powder, known commercially as "poudre de poivron"; powdered *Physalis alkekengi* pericarp; turmeric; powdered red sandalwood; powdered Pernambuco wood; various starches; and "dressings" of different kinds. (See also *Y.B.*, **1906,** 68; **1908,** 172; **1909,** 176; and *Gen. Index.*)

Savin Powder, Histology of. C. Gallois. (*J. Pharm. Chim.*, 1910, **2**, 435.) In 1896, Collin published a description of the microscopical structure of powdered *Juniperus sabina*, showing that much of the commercial powder was derived, not from true savin, but from the closely allied *J. phoenicea*. The chief distinctive elements were stated to be numerous, thick walled, rounded sclerenchymatous cells; these were present in quantity in powdered *J. phoenicea*, but totally absent from powdered *J. sabina*. The author finds, however, that this is not the case when the original drug contains fruits, as it often does. The fruits of *J. sabina* also contain numbers of rounded sclerenchyma, very similar to those of *J. phoenicea*. The presence of a few of these structures in powdered savin is not, therefore, absolute proof of admixture with *J. phoenicea*. Figures of the sclerenchyma of the two savins are given.

Scammony Root, Mexica. (*Evans' Analyt. Notes*, 1910, 67.) Samples of the Mexican root, evidently from the variety, *Ipomea triflora*, have contained 11·5 to 19 per cent. of resin, calculated on the moist root, the moisture varying between 9·8 and 12·5 per cent.

Sitodrepa panicea, the Drug-Room Beetle, and Detection of Chitin in Powdered Drugs. H. G. Greenish and Dorothy M. Braithwaite. (*Pharm. J.*, 1911 [4], **31**, 580.) The life history of the minute brown beetle which is ubiquitous among drugs, and the larva of which does a vast amount of damage, is described. Drawings of parts of the beetle are given. To detect particles of chitin, the main constituent of the hard parts of this and other insects, in powdered drugs, the following process was devised. It depends on the extraordinary resistant powers of this substance to chemical reagents which will destroy other forms of organic matter.

Defat 5 Gm. of the powder with Et_2O in a Soxhlet; dry the defatted powder and boil it with 100 c.c. of 5 per cent. HCl for 5 minutes in a tared flask; add about 150 c.c. of water, allow the powder to settle, and wash once by decantation. For every 35 Gm. of water and powder in the flask add 6 c.c. of strong H_2SO_4, cool, and then add, in small portions and cooling again if there is any considerable rise in temperature, 10 c.c. of a 1 in 1 aqueous solution of chromic acid. Allow the mixture to stand with occasional agitation for 36 hours, or longer. Separate the solid particles by centrifugation, wash them with water,

alcohol, and ether successively, dry, remove from the tube, and mount in xylol balsam.

Modifications of this complete method, indicated by the nature of the powder under examination, will readily suggest themselves; thus, if it contain but little that is soluble in ether the treatment with this solvent may be omitted, and similarly that with the hydrochloric acid; the residue in the centrifuge tube, after washing with water, may be examined at once under the microscope if a permanent preparation is not desired. Eighteen hours often suffices, but a better result is obtained by allowing the oxidizing mixture to act for 36 or 48 hours, after which time the residue will usually consist of little else than sand and beetle, the amount depending chiefly on the amount of sand present in the powder. The particles of beetle are readily detected by their conspicuous colour, and most of them will exhibit either hairs or the scars of hairs.

When the infinitely small weight of the fragments of the insect that can be detected with certainty under the microscope is considered, it is evident that this method should allow of the detection of very small proportions of the beetle. Mixtures of 5 Gm. of powdered rhubarb, previously proved to be free from *Sitodrepa*, with a quantity of a very carefully prepared trituration with sugar of milk containing 0·00001 Gm. of the beetle, were prepared. The residue obtained after treating as described was very insignificant in amount, but contained several fragments of the beetle which could be identified without difficulty.

A number of specimens of powdered spices and drugs have been examined with the view of ascertaining whether the method is generally applicable, and the following results were obtained :—

	No of Samples.	Result.
Ginger	6	Two contained beetle in powder, one contained beetle intact.
Nutmegs	4	All contained beetle.
Coriander	1	Contained beetle.
Capsicum	1	Free.
Dandelion Root	1	Contained beetle.
Rhubarb	1	Free.
Ergot	1	Contained beetle.
Belladonna Root	1	Contained beetle.
Aconite Root	1	Free.
Belladonna Leaves	1	Two or three fragments of doubtful identity.

So ubiquitous is this pest that considerable discretion must be exercised before condemning a powder in which traces only of it can be detected. At the same time, although its presence does not appear to be injurious to health, it seems obvious that powders prepared from worm-eaten spices or drugs should not be offered for sale to the prejudice of the purchaser, or in undue competition with those prepared from sound ones.

Although the drug-room beetle is the commonest, it is by no means the only beetle that attacks drugs. During the short time the subject has been under observation the following other species of coleopterous insects infesting drugs have been identified.

Lasioderma serricorne, the cigar beetle, which closely resembles the drug-room beetle, but may be distinguished by the wing-cases, which are not striated; it is said to be on the increase, and to have probably the same range of food-material as *Sitodrepa*. *Niptus hololeucus*; this is brown in colour, but much larger than *Sitodrepa*. *Lathridius bergrothi* and *Cartodere filum*, both of which were infesting marshmallow root that had been kept in a damp room. In addition, *Ptinus fur* and *Ptinus brunneus* are included by Chittenden amongst the principal household insects; they attack flour, capsicum, musk root, powdered senna, and jaborandi. Others are mentioned by Tschirch, Sayre, Lojander and other writers.

In the course of the investigation, the interesting fact was ascertained that the excreta of larvæ of *Sitodrepa* consists almost entirely of starch; or in the case where the roots of composite drugs were the food, of inulen. It would appear, therefore, that the larvæ are unable to digest the carbohydrates of the drug on which they prey, but derive their nourishment from the more highly nitrogenous ligneous constituents. [From a biological point of view, this point is of considerable importance. The chitinous framework of insects is rich in nitrogen.—Ed. *Y.B.*]

Weed Seeds, Deleterious, in Cereal Meals, Detection of. G. d' Ippolito. (*Staz. sperim. agrar. ital.*, **43**, 585; *Chem. Zentralb.*, 1911, **1**, 39.) The meal is treated with 10 per cent. hydrochloric acid, when various weed seeds may be recognized by the colours given, which are evident as specks on the yellow ground of the pure meal when so treated. *Melampyrum arvense* gives a green colour; *Lolium temulentum* and *Lathyrus aphaca*

show red spots. Under the microscope the cells of the pericarp of *Lolium* thus treated are seen to be bright red, while those of the seed coats of *Lathyrus* are wine-red.

Walnut Hulls as a Vegetable Adulterant. H. Kraemer. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 995.) The dried outer pericarps of the walnut, *Juglans regia*, have been imported into the U.S.A. as a substitute for the inner walnut shells and olive pits for adulterating powdered drugs. The microscopical characters of this adulterant are figured and described.

PHARMACOLOGY AND THERAPEUTICS

Acetone Alcohol for Skin Sterilization. (*Merck's Report*, 1910, **23,** 85.) O. von Herff advocates the use of a wash of equal volumes of acetone and alcohol 95 per cent., applied for 5 minutes just before gynaecological operations to remove superficial bacteria and prevent the appearance of those more deeply seated. The application is made with gentle friction with a flannel. It is claimed that this is superior to other treatment, since it does not soften the skin. The treated area is then at once painted with simple tincture of benzoin. Hairs in the operation field should be removed the day before.

Acne, Treatment of. G. Fouquet. (*J. Pharm. Chim.*, 1911, **3,** 273.) For ordinary acne, after spraying with boiled water, or with 1 per cent. solution of resorcinol, the following lotion of Gaucher may be applied: Precipitated sulphur, finely sifted, 4; French chalk, finely sifted, 2; glycerin, 60; rose water, 120; tincture of quillaia, 10. For necrotic acne, the following ointment may be used: Precipitated sulphur, 10; salicylic acid, 1; soft paraffin, 100. When the scalp is affected, Sabouraud prescribes: Precipitated sulphur, 1; red mercuric sulphide, 1; cade oil, 10; cacao butter, 10; soft paraffin, 20.

Acne, Indurated, Shoemaker's Ointment for. (*Formulary of Nouveaux Remèdes*, 1911, **28** [8]. 2.) Salicylic acid, 1·2 Gm.; hydrastine hydrochloride, 0·18 Gm.; sulphur, 2 Gm.; cold cream, 32 Gm.

Aconitine for Trigeminal Neuralgia. (*Merck's Report*, 1910, **23,** 93.) The lack of reliable pharmacological data to guide the administration of this potent drug is alluded to, and the

desirability of further work in this direction pointed out. For this only the definite crystalline base should be used. Results published by Fuchs indicate that aconitine, properly administered, is a specific for trigeminal neuralgia. Success has attended its use in sixteen severe cases. The official tincture of aconite is stated to be quite unreliable. An energetic purge should follow each dose, when all danger of cumulative action is avoided. For this purpose he gives 1½ grains of calomel every 10 hours, as well as an aperient mineral water. The dose, according to Merck, should not exceed 0·2 to 0·3 *milligramme* ($\frac{1}{300}$ to $\frac{1}{200}$ grain), nor be more than 0·6 *milligramme* ($\frac{1}{100}$ grain) in 24 hours. But at present there are no reliable data to decide the dose. The patient should be carefully watched, and the first symptoms of paraesthesia of the tongue, lips, and hands carefully looked for.

Adrenine (Suprarenine), Synthetic, and its Preparations. Euler. (*Deutsch. Zahnarzt. Woch.*, 1910 [38]; *Nouveaux Remèdes*, 1911, **28,** 57.) The author confirms the statement of Dixon and Cushny (*Y.B.*, **1908,** 6) that racemic, optically inactive, synthetic adrenine (suprarenine) has only half the action on the blood pressure of natural lævo-rotatory adrenine (adrenaline). He also states that after eliminating the dextro-rotatory form, the lævo-rotatory synthetic base is identical pharmacologically with that derived from the suprarenal capsules. For dental use before extractions the bitartrate of lævo-rotatory adrenine is considered to be the best salt to use for injection, since it is much more stable than the borate or hydrochloride. It is prescribed combined with novocaine. Only a very minute dose of the adrenine tartrate should be employed. The following is the formula for the injection advocated. Novocaine, 0·2 Gm.; lævo-rotatory synthetic adrenine tartrate, 0·91 *milligrammes*; NaCl, 0·09 Gm.; distilled water, 10 c.c. If required, 3 or 4 c.c. of this solution may be injected, one c.c. being the usual dose. (See also *Y.B.*, **1905,** 172; **1906,** 155; **1907,** 22, 223; **1908,** 7, 261.)

Airol Vaseline for Recent Wounds and Crural Ulcer. K. Gerson. (*Apoth. Zeit.*, 1910, **25,** 1015.) Airol, 5; yellow vaseline to make 100. Applied to the surface of recent wounds it allays pain, is antiseptic, and promotes healing. For crural ulcer, the addition of camphor, 1, should be made to the above. This stimulates granulation.

Albargin, Sodium Nitrate to Increase the Penetration of. (*Merck's Report*, 1910, **23,** 98.) Conquist has found that the addition of 1 : 1,000 of $NaNO_3$ increases the rate of dialysis of albargin by 10 per cent. and in a still greater proportion by adding 2·5 : 1,000. It is suggested that this addition may increase its deficient penetration, when used for gonorrhœa and similar affections. It may also have the same effect with other silver-albumin compounds.

AmCl as a Remedy for Drunkenness. — Hennel. (*Eclect. Med. J.; Nouveaux Remèdes*, 1911, **28,** 139.) AmCl in doses of 30 to 60 grains, freely diluted, and followed by copious draughts of water, is stated to be an efficient remedy for alcoholic intoxication, speedily restoring the patient to sobriety. It may even avert delirium tremens. Smaller doses, often repeated, may be given, but the larger dose is preferable. It should be well diluted, to avoid gastro-intestinal irritation.

Amyl Alcohol as a Palliative Application for Inoperable Cancer. — Horand. (*J. des Pract.; Nouveaux Remèdes*, 1910, **27,** 455.) From 3 to 10 drops applied to the surface of the cancer causes it to exude an abundant secretion, charged with detritus and toxins, which are thus eliminated. The unpleasant odour is also modified. The growth dries up, and sometimes cases which were originally unsuited for surgical interference have become suitable for removal.

Apocynum cannabinum as a Diuretic. (*Merck's Report*, 1910, **23,** 198.) Kraemer reports on a case in which the fluid extract of apocynum in doses of 12 to 15 drops three times daily acted very promptly in a case of ascites with arteriosclerosis and liver enlargement, in which the ascites and œdema has not been alleviated by the usual diuretics. Although, in this case, the improvement was not permanent, the rapidity of the action indicates that the drug is worthy of further investigation.

Ergot, Review of the Chemical Work on the Active Principle of. A. C. Crawford. (*Amer. J. Pharm.*, 1911, **83,** 147.) A complete historical survey of the chemical history of ergot with over 70 detailed references to the literature of the subject. The period covered commences with the article by Stearn published in 1807, and concludes with the latest investigations of the

present time. The author thus sums up the chemical history of the drug.

Investigators have long recognized in ergot the presence of two bodies which have been designated as alkaloids. The specific alkaloid, ergotoxine, is present in such small quantities that we cannot trace the entire therapeutic action of the drug to this base alone. It would be well to decide whether the action of ergotoxine is not really due to an amino-group. The evidence at present points to the fact that ergot owes its activity to the presence of various basic amino-compounds, and this is supported by the fact that only fresh ergot is official in certain pharmacopœias, as it is known that it rapidly degenerates with the formation of tri-methylamine. It is interesting to note that practically every preparation introduced by chemists or pharmacologists has been endorsed by some clinicians as useful in labour. This may perhaps be explained on the basis that all such preparations have carried mechanically with them some of the active constituents of ergot, but the conditions under which labour pains intermit and recur are so little understood, that it is rather difficult to always show the relation of ergot to such pains.

Banana Flour as a Food for Infants. E. Pritchard. (*B.M.J.*, 1910, **2**, 1145.) For many years past the author has recommended the addition of mashed banana to the milk mixtures of artificially-fed infants. A decoction of banana gruel can be made expeditiously, owing to the solubility of the major portion of the carbohydrate elements. A satisfactory gruel can be made in a few minutes by rubbing up a heaped tablespoonful (1 oz.) of banana flour with a pint of water, and then boiling for 5 minutes. A gruel made in this way has excellent colloidal properties when added to milk in equal quantity; it thickens the milk, and prevents formation of a leathery coagulum of casein, and satisfies the appetite of hungry infants more effectually than simple milk dilutions. The decoction made in this way has not an attractive appearance, for it is of a light chocolate colour, owing to the presence of a pigment which tenaciously adheres to the starch molecules, and which cannot be bleached by ordinary bleaching reagents. It has been urged against bananas and banana flour that the contained fibre has an injurious influence on the delicate mucous membrane of the infant's intestine. This is not found to be the case. The crude flour is preferable to the more highly refined preparations sold

under fancy names as banana meal freed from all fibre. The whiteness of these preparations and their general character indicate that they probably contain very little of the original banana, and a large proportion of ordinary cereal flour. The nutritive properties of banana flour are high, as is shown by the following figures, which represent those of an analysis made by A. H. Church of a sample of Jamaica banana meal: Water, 15·5 per cent.; albuminoids, 2·5 per cent.; starch, sugar, gum, etc., 77·7 per cent.; oil, 1·0 per cent.; fibre, 0·7 per cent.; ash, 2·7 per cent.

Many analyses give a higher value for the albuminoids; this is due to the fact that the whole of the nitrogen present in banana meal does not exist in albuminoid form, but partly in the form of amides.

With the exception of the lower protein content, banana meal compares favourably as a food with most cereal flours. Although occasionally used in the West Indies as an exclusive food for infants, it is obviously highly unsuited to this purpose, but in the form of a decoction it is an excellent diluent of cow's milk.

Boric Acid, Inertness towards Ferments. H. Agulhon. (*J. Pharm. Chim.*, 1910, **2**, 363.) Boric acid, even in saturated aqueous solution, does not arrest the action of diastases which hydrolyse carbohydrates or enzymes which attack proteins. Its retarding action towards these enzymes is very slight. Among the ferments experimented with are sucrase, amylase of the pancreas, emulsin and trypsin. Boric acid is inactive towards oxydases and peroxydiastases. In some unexplained manner it seems to favour the action of coagulation; this result is observed in three diverse forms of coagulation—that of milk, pectin, and of melanins. On the whole, boric acid is remarkably inactive on ferments as a class.

Cactus grandiflorus, Inertness of. — Hatcher and — Bailey. (*Journ. Amer. Med. Assoc.; Drugg. Circ.*, 1911, **55**, 133.) In view of conflicting testimony regarding the therapeutic activity of *Cactus grandiflorus*, the authors have conducted an extended series of experiments to determine the question. No doubt that much of the misunderstanding which exists in regard to this drug has arisen through the substitution of other substances for *Cactus grandiflorus*. They consequently were careful to procure authentic specimens. They were unable to

obtain any evidence that the true Mexican *Cactus grandiflorus* possesses any pharmacological action whatever, but on the contrary, it appears to be a singularly inert substance when administered either by the mouth or by the vein. When colossal doses of *Cactus grandiflorus* are given by the vein they some times—but not always—appear to exert an extremely feeble action on the heart; but this action is so slight that its nature could not be determined. (See *Y.B.*, **1910,** 209.)

Cardiac Stimulants and Depressants, Comparison of Results of Physiologial and Chemical Standardization of. T. S. Githens and C. E. Vanderkleed. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 913.) In the case of digitalis it is found that the value obtained for the amount of digitoxin present determined by chemical means closely agrees with the physiological test. In the case of aconite, the two methods of assay are less concordant. With gelsenium it is found that the chemical test is worthless unless it be checked by physiological results. In the case of veratrum, the physiological activity agrees closely with the amount of alkaloids found by chemical methods.

Casimiroa edulis as a Hypnotic. (*Merck's Report*, 1910, **23,** 200.) The fluid extract of *Casimiroa edulis* seeds, in doses $2\frac{1}{2}$ fluid drachms, is found to be a valuable hypnotic by a number of observers. Smaller doses give but transitory results; but with 2 drachms, or more, sleep lasting 5 to 6 hours is obtained, and is not followed by any unpleasant after-effects. It may be given to elderly patients and in cases of kidney disease, but is contra-indicated in myocarditis.

Catha edulis and its Alkaloid. — Chevalier. (*J. Pharm. Chim.*, 1911, **3,** 603.) In 1900 Beitter isolated an alkaloid, $C_{10}H_{18}ON_2$, to which he gave the name katine. The drug yields from 1·1 to 1·25 of this. It is soluble in EtOH, in $CHCl_3$; sparingly soluble in Et_2O, in water, and in petroleum ether. It forms crystalline salts. The author has conducted some pharmacological experiments with this base, which is but slightly toxic. It has the nervine stimulant properties of cocaine, without its analgesic or local anæsthetic action: in its action on the heart it is tonic, like caffeine. It is suggested that it may be a valuable therapeutic agent for the treatment of drug habits, such as morphinomania.

Chenopodium Oil, Method of Administration. (*Apoth. Zeit.*, 1910, **25,** 121.) To ensure complete action, oil of American wormseed should be given for two days running, in doses administered twice daily to patients under 14 years and three times daily to adults. Two hours after the last dose a brisk purge of castor oil should be given, for chenopodium oil is constipating. In some cases it occasions nausea, to obviate which it is best dispensed in capsules, combined with menthol, 16 minims of oil with 3 grains of menthol for an adult. Six of these are sent, and three are to be taken each day, with a little milk or coffee. For children of 6 to 8 years of age, the dose is 8 minims, twice a day; of 10 years, 10 drops; and 11 to 16 years, 12 drops. Thus given the remedy is very efficacious.

Chloroform Inhalation to arrest Pulmonary Hæmorrhage. J. B. Fish. (*Merck's Report*, 1910, **23,** 162.) The inhalation of $CHCl_3$ is stated to be an excellent means of arresting hæmorrhage from the lungs. The patient, in a semi-recumbent position, is made to inhale the vapour from saturated cotton wool, or from a mask. From half to 1 drachm is usually enough. Afterwards from 15 to 20 drops are inhaled every hour, for a few days, as a precaution against recurrence.

Collargol Ointment for Ascites. H. Riehl. (*Muench. Med. Woch.; Nouveaux Remèdes*, 1911, **28,** 75.) Friction of the abdomen with Crédé's collargol ointment has been found to be effective for relieving dropsy. The collargol had a pronounced diuretic action and the stools also became more liquid. About 30 Gm. of the ointment was employed at a time, and the frictions were repeated every 3 or 4 days.

Collargol Solution and Ointment for Ophthalmic Use. Daxenberger. (*Pharm. Zentralh.*, 1910, **52,** 388.) For application to the cornea, for gonorrhœal infection, and for the antiseptic treatment of the eyes of newly born infants, collargol is one of the best of the silver compounds. Tablets containing 0·05 to 0·25 Gm. are convenient for preparing a 2 per cent. solution. This does not require sterilizing, and will keep at strength for a month. A useful ointment for ophthalmic use is: Collargol, 0·3 to 0·60 Gm.; distilled water, 1·5 c.c.; oil of wintergreen, 2 drops; lanoline to 30 Gm.; or Crédé's ointment, 5; paraffin ointment, 5 to 10.

Copper, Antiseptic Properties of. A. Springer and A. Springer, jun. (*Chem. Zeit.*, 1910, **34,** 585–595.) Experiments with the putrefactive bacilli, *Proteus vulgaris* and *Clostridium fetidum* show that copper salts are very strongly antiseptic; even when present to the extent of 1 in 2,000,000, a perceptible action is observed. Copper salts should therefore be useful remedies in cases of diseases characterized by increase of the number of putrefactive bacilli in the gastro-intestinal canal.

Coumarin, Pharmacology of. (*Merck's Report*, 1910, **23,** 173.) Although coumarin has a wide application for perfumery and flavouring purposes, its pharmacology has not received much attention. A. Ellinger finds that in relatively large doses, 0·02 to 0·05 Gm., it causes deep anæsthesia in the nervous system of frogs when given by hypodermic injection; and in rabbits 0·15 to 0·2 Gm. causes the same, which lasts for 10 minutes. For rabbits 0·3 to 0·4 Gm. per kilo is the lethal dose. An adult animal was given 10 Gm. of coumarin for 14 days without suffering any permanent injury, recovering rapidly when the treatment was stopped. Cianci attributes a sedative action to coumarin resembling that of camphor. It also reduces the temperature. No therapeutic work appears to have been done with it. [The fact that coumarin in contact with the mucous membrane may cause intense inflammation and an eczematous eruption does not appear to be generally known. Those who have to handle large quantities are but too familiar with this property. When powdering coumarin, care should be taken that the dust does not come into contact with the nasal mucous membrane.—Ed. *Y.B.*]

Digitalis, Variability of. Worth Hall. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 924.) It is found that first year's leaves are not necessarily weaker than the second year's growth. They may be used for the preparation of standardized galenicals. There is no marked difference between wild and garden grown leaves. Excessive drying is not essential in preventing deterioration, but thorough rapid drying to less than 10 per cent. of moisture is essential. The assay of the crude drug does not necessarily ensure a uniform finished product. Galenical preparations of digitalis vary greatly in their keeping properties, but deterioration from age is slight if alcohol 70 per cent. be the menstruum used.

Ergot, Pharmacology of. Wood and Hofer. (*Arch. of Int. Med.*, **1910**, *B.M.J. Epit.*, 1910, **2**, 92.) Retail preparations of ergot are almost invariably below the standard. Provided that an active specimen of crude drug is used, a freshly-made fluid extract will be potent, but both the crude drug and the fluid extract deteriorate rapidly, especially when exposed to the air, and therefore it is advisable that all preparations should bear the date of manufacture, or at least the date beyond which they will not be reliable, and they should be preserved in small, hermetically sealed bottles. A fluid extract of ergot deteriorates approximately 10 per cent. per month, even when protected from contact with air. It is stated that the lack of activity of commercial samples may be due to original inertness, changes in the crude drug, improper methods of extraction, or changes after manufacture. Spanish ergot was found to be more active than German. The best method of keeping crude ergot is to dry it at low temperature, and then protect it hermetically from atmospheric influences. The fluid extract proved to be quite as unstable as the crude drug, the loss of potency in one case being as high as 5·5 per cent. per week, and in every instance the preparation had invariably lost 50 per cent. of its active principle in five months, while in those hermetically sealed the diminution in sphacelotoxin content ranged from 0·2 per cent. to 1·1 per cent. per week, amounting to nearly 50 per cent. per yearly average. The percentage of sphacelotoxin in a fluid extract may be ascertained by precipitating with water and extracting with benzol.

Ether as a Dressing to Abscesses. (*Merck's Report*, **1910**, **23**, 95.) Souligoux has found that ether applied on pads of gauze to discharging abscesses is a most successful method of treatment. The dressing is covered with impermeable material, and the ether renewed hourly by application to one end of the pad, slightly raised for the purpose. Abscesses of considerable size rapidly heal under this treatment without operative interference.

Eugallol, Action of, on Mucous Surfaces. O. Ehrmann. (*J. Pharm. Chim.*, 1910, **2**, 131.) The action of eugallol on the mucous membrane is quite different to that it exerts on the epidermis. In the former case it acts as a superficial anæsthetic caustic. It occasions a transitory pain followed by anæsthesia.

For this purpose it is prescribed in a 5 per cent. solution in a 50 per cent. mixture with castor oil as a dressing to mucous surfaces.

Formic Acid, Pharmacological Experiments with. (*Merck's Report*, 1910, **23,** 87.) Rabbits fed for four weeks with food containing 1 per cent. of formic acid showed no methæmoglobin in the blood. Nor was this found even with a treatment of 2 per cent., although in this case the animals died, losing weight rapidly. With less than 1 per cent. they at first lost weight, then began to gain in weight again. Concentrations of 0·5 per cent. were non-poisonous to these animals.

Goat's Milk for Infant Feeding. N. H. Alcock. (*B.M.J.*, 1911, **1,** 622.) Where the natural milk is insufficient, or nursing cannot be performed, goat's milk unsterilized and untreated in any way is an excellent substitute for human milk. A child of seven weeks was given, at first, one feed of 3 fl. oz. goat's milk per diem, gradually increased as the natural supply diminished, until six feeds, each of 4 to 5 fl. oz., were being taken daily. The average gain in weight, from originally 3 to 4 oz. per week, increased to 6 to 8 oz. Digestion was practically perfect, and the infant had the characteristic appearance of a well nursed child.

Gonioma kamassi, South African Boxwood, Pharmacology of. W. E. Dixon. (*Proc. Royal Soc.*, 1911, Series B, **83,** 287.) The investigation was instituted in consequence of toxic symptoms having been supposed to follow sawing and manipulating the wood in the manufacture of shuttles. The wood was carefully identified to distinguish it from that of *Buxus macowani*, "East London boxwood," and of *Sarcocephalus diderrichii*, West African boxwood. An alkaloid was isolated from the sawdust of the wood, for the author, by E. F. Harrison. Experiments with this alkaloid on animals show that it belongs to the curare group, exciting the spinal cord, paralysing the nerve cells, and paralysing the motor nerve endings. The symptoms observed in man, attributed to the wood, are in some respects similar to those obtained with animals. But the amount of alkaloid necessary to produce these symptoms is so large, and represents so much wood, that its absorption, by the ordinary methods of working, is out of the question. The appearance of toxic symptoms among some workmen, but not all, who have handled the wood is attributed to marked idiosyncrasy rendering certain individuals extremely susceptible to the poison. This

idiosyncrasy may be compared to that of hay fever; and the symptoms are somewhat similar; headache, irritation of the eyes, nasal catarrh, and respiratory trouble. Although East African boxwood is a poison of the curare group, the majority of recorded cases of poisoning cannot be attributed to the specific effects of its alkaloid.

Hexamethylene Tetramine eliminated in the Secretion of the Middle Ear. W. M. Barton. (*J. Amer. Med. Assoc.*, 1910 [11]; *Nouveaux Remèdes*, 1910, **27,** 531.) It is found that when hexamethylene tetramine is given internally it occurs, shortly afterwards, in the secretion of the mucous membrane of the middle ear. Consequently a useful method of antiseptic treatment is available, enabling suppuration and similar affections to be treated much more effectively than with locally applied dressing. A dose of 5 grains, three times a day, is given for this purpose.

Hordenine Sulphate, Therapeutics of. (*Merck's Report*, 1910, **23,** 231.) Hordenine sulphate is a useful cardiac tonic; it is given in doses of $7\frac{1}{2}$ to 30 grains in 24 hours. It is also useful in gastric hypersecretion and for intestinal disturbances, when it is prescribed in 4 grain doses in a simple mixture. It is specially useful for the gastero-enteritis of children.

Hypophosphites, Decomposition of, in the Organism, and Detection of in Urine. A. Patta. (*Archiv. Farm. speriment*; *Nouveaux Remèdes*, 1910, **27,** 463.) Although phosphates and phosphites when administered are eliminated almost *in toto* as such, in the urine; when hypophosphites are given by hypodermic injection only about half the amount given can be found again in that excretion. To determine the amount, the filtered urine is acidified with acetic acid, and the phosphates are removed by adding a standardized solution of uranium acetate. After removing the precipitate, an aliquot part of the filtrate is treated with $HgCl_2$. After standing, protected from light, for 24 hours, the precipitated HgCl is collected and weighed. From this the equivalent of hypophosphorus acid is calculated. Another portion of the original filtrate is treated with HNO_3, which converts the HPH_2O_2 into H_2PHO_3, when it may be titrated with N/10 uranium acetate solution.

Indian Hemp, Standardization of Preparations of. C. R.

Marshall and J. H. Wigner. (*B.M.J.*, 1911, **1**, 1171.) The authors find that iodine absorption value suggested by Hooper (*Y.B.*, **1908,** 442) as a factor for determining the commercial value of charas, cannot be applied to the physiological standardization of the drug and of its preparations, since cannabinol of high physiological potency is found by experiment to have a lower iodine value than almost inert constituents. The oxidation of cannabinol, although it profoundly modifies its physiological activity, does not greatly lower the iodine value.

Iodine Compounds with Fatty Acids for Medicinal Use. Posternak. (*J. Pharm. Chim.*, 1910, **3,** 30.) The iodo-compounds of fatty acids containing two molecules of iodine, such as the di-iodo elaidic acids, containing 45 to 47 per cent. of iodine, are most suitable for therapeutic use. These form definite, white, crystalline compounds, stable in the air and on exposure to light. They are tasteless, and insoluble in the acid gastric secretion, but rapidly decompose in the alkaline intestinal fluid. They are distinctly preferable to potassium iodide for medicinal use. Iodine may be detected in the saliva in an hour after the dose has been taken.

Iothion Ointment for Enlarged Glands. C. Stamm. (*Therap. Monats.; Apoth. Zeit.*, 1911, **26,** 16.) Iothion, 2; anhydrous wool-fat, 9; yellow vaseline, 9. The ointment is applied with a gentle massage for 3 to 5 minutes, and the part is then covered with waterproof material and a light bandage. This application is useful for acute and chronic enlargement of the glands in children.

Kamala, Pharmacology of. A. Semper. (*Nouveaux Remèdes*, 1911, **28,** 84; *Archiv. exper. Path.*, **63** [1] and [2].) Kamala exercises a toxic action on frogs and on tapeworms. The symptoms excited with frogs are similar to those produced by male fern, and its action on the nerves and muscles is also similar to that of the anthelmintic ferns. Rottlerin and the ether extract of kamala have the same action, but less intensely. With dogs, no absorption of kamala or of its constituents could be noted from a single dose; but under prolonged treatment with the drug local action on the intestines and albuminuria were noted.

Magnesia as a Dressing for Burns. Ohleyer. (*Apoth. Zeit.*, 1910, **25,** 708.) The surface of the burn is thickly covered with MgO, two layers of gauze and a layer of absorbent cotton are then applied and kept in place by a loose bandage. The

MgO dressing is renewed twice daily. Any adhering powder is wiped off the wound with a pad of cotton moistened in a 1 : 1,000 solution of lysol. Severe burns heal rapidly under this treatment. The alkalinity of the MgO neutralizes and absorbs the acid secretions.

Male Fern, Extract of, Externally for Skin Diseases. Laner. (*Monats. Prakt. Dermatol.*, 1910, **51** [4]; *Pharm. Zentralh.*, 1911, **52,** 42.) The local application of ethereal extract of male fern has been employed with success for the treatment of various skin eruptions. For acute eczema, the extract may be diluted with two parts of ethereal tincture of valerian, and for subacute cases with one to one and a half parts. The mixture is painted on at night, and washed off with soap and water the next morning, and then dressed with glycerin and lead ointment. In acute cases, the parts should be poulticed for two or three days before applying the extract.

Menthol, Necessity for Caution in the Use of. Triboulet and — Laurens. (*Rev. Med. du Bullet. Sci. Pharm.*, 1911, **7** [4], 86.) In view of the widespread domestic use of menthol as a remedy for coryza and "colds"—attention should be drawn to the fact that it may produce intense irritation of the mucous membrane, and even a dermatitis, resembling erysipelas in appearance. As a rule menthol should not be applied in greater strength than 1 : 100 solution. Some individuals are very intolerant to it. It has been known to cause erythema of the lips and nose, conjunctivitis, pharyngeal cough in children, and spasmodic affections of the larynx threatening asphyxia. Therefore mentholized oil should not be used for very young children, and its application should be watched in the case of adults.

Mercurial Injections with Metallic Hg. E. Richter. (*Apoth. Zeit.*, 1910, **25,** 695.) Having found by experiments on animals that metallic mercury, when injected in comparatively large doses, either into the circulation or into the tissues, is non-toxic, and readily absorbed, the author has used it on human beings and has given as much as 0·5 c.c. or 6 Gm. of metallic Hg in one dose without observing any ill effects. Stringent aseptic precautions should be taken, and the injection should be made into a muscle rich in fat, such as those of the buttocks. The finest needle can be used, and no induration or pain will follow the

operation. The dosage of metallic Hg can be most accurately adjusted.

Mercury Oxycyanide Injection for Syphilis. — Jessner. (*Nouveaux Remèdes*, 1910, **27,** 319.) One or 2 per cent. solutions of mercury oxycyanide with or without alypine nitrate as an anæsthetic are used for the mercurial treatment of syphilis. One c.c. of the 1 per cent. solution is injected daily except on three days, then 1 c.c. of the 2 per cent. solution is given. The toxicity of the salt depends more on idiosyncrasy than on the reaction of the drug.

Peruvian Balsam as a Nasal Disinfectant. H. Bourgeois. (*Nouveaux Remèdes*, 1910, **27,** 456.) As a general disinfectant and antiseptic Peruvian balsam is most effective. It may be applied in the form of an ointment. Peruvian balsam, 0·75; lanoline, 5; vaseline, 10. This may be conveniently put up in a collapsible tube. A little smeared on the nasal mucous membrane will cut short an attack of coryza, if applied soon enough. It should be applied night and morning to the nostrils by those exposed to infection.

Potassium Bichromate for Phthisis. J. B. Tombleson. (*Lancet*, 1910, **179,** 1484.) The use of $\frac{1}{4}$ grain doses of $K_2Cr_2O_7$ in solution has given sufficiently good results in six cases of phthisis to warrant a more extended trial. The dose is given in a wineglassful of water, three times a day, after food. Sometimes the first and second dose occasion vomiting, but toleration is quickly established. The bichromate may be prescribed in a tonic mixture, or alone. Any change of colour in the solution does not appear to affect its efficacy.

Radium, Therapeutic Uses of. H. C. Gardner and O. A. Ellis. (*Pharm. J.*, 1911 [4], **32,** 335.) The nature of the various radium rays, and the emanation, the standards for radiant energy, the effects of the external and internal application of these rays and products, and some instruments by means of which they may be applied, are described.

Salicylic Compounds, Relative Therapeutic Value of. — Pinczower. (*Nouveaux Remèdes*, 1910, **28,** 8; *Therap. Monats.*, June, 1910.) The author considers that in actual therapeutic value there is nothing to choose between salicylic acid,

sodium salicylate, salipyrine, salol, aspirine, and benzosalin. The only points to be considered are the taste, and the action on the digestive organs. When the above are given in doses equivalent to 1 Gm. of salicylic acid, the period of elimination in the urine is so nearly identical that, for all practical purposes, it may be considered to be the same.

Salvarsan. Hoppe and Schreiber. (*Fortsch. Med.*; *Nouveaux Remèdes*, 1911, **28,** 27.) At the Wiesbaden Medical Congress, the authors recorded the results of the use of the new remedy of Ehrlich and Hata on 100 cases of syphilis. The injections were thus prepared. In a graduated 50 c.c. cylinder, 0·30 Gm. of the substance was triturated with 10 c.c. of sterilized distilled water; sufficient N/NaOH solution was then added to almost entirely dissolve the suspended matter. This took from 2·0 to 2·3 c.c. The volume was made up to 20 c.c. The dose for an injection is 10 c.c. of this. Injection is made slowly into the muscles of the buttock. No anæsthetic is used, since the pain is transitory. In 22 cases the injection was followed by an elevation of temperature; in 2 a rash appeared. There can be no doubt as to the value of the remedy, for improvement was manifest in every case treated. Improvement was often marked in 24 hours. Of 25 cases giving a positive result with Wassermann's reaction, 23 gave a negative reaction after treatment with salvarsan. The time which has elapsed since the treatment precludes any statement with regard to relapses, but the opinion is expressed that the remedy is, in one dose, a specific for syphilis, and in that quantity absolutely devoid of toxicity.

Salvarsan for the Treatment of Syphilis. G. Stopford-Taylor and W. Mackenna. (*Lancet*, 1911, **180,** 1412.) The glass bulbs in which salvarsan is supplied should not be opened until immediately before the drug is to be used, since exposure to the air may lead to oxidation and the formation of As_2O_3. As the drug contains about 34 per cent. of arsenic, and each bulb contains about 9 grains of salvarsan, if the bulb be left unsealed and complete oxidation should take place, the patient would get 3 grains of As_2O_3. The intravenous injection is the most efficient method of administering the drug, for by this means it is carried straightway by the blood-stream into every blood-vessel in the body which is not thrombosed or otherwise occluded, and the lethal effect upon the spirochætæ is imme-

diate and far reaching. The authors are firmly convinced that salvarsan is the most potent remedy for syphilis, and point to various errors in technique as accountable for the failures experienced in some cases. The solution prepared with sodium hydroxide should be made up with normal saline solution to a bulk of 8 or 10 ozs. before injection. The normal saline solution must be made with distilled water, or a turbid liquid will result on the addition of salvarsan. Its use should be preceded and followed by some ounces of normal saline, preceded—to discover if the needle is lying properly in the vein, and followed—so that the vein wall may be washed free from the irritating drug. Much has been made of the possibility of salvarsan setting up optic atrophy, as atoxyl has been known to do, resulting in permanent blindness. The authors regard the danger of this as almost negligible, especially if the drug is administered by the intravenous route, because the arsenic is all eliminated in the course of a few days.

Salvarsan (606) for the Treatment of Syphilis. C. F. Marshall. (*Lancet*, 1911, **180,** 501.) The author does not consider it to be proved that salvarsan is superior, or even equal, to the mercurial and iodide treatment of syphilis. It has not yet been proved that salvarsan effects an abortive cure of the disease. Although its administration may occasion the rapid healing of certain syphilitic lesions, it has yet to be shown that even these results are permanent. It has been proved that its administration is not unattended with danger; in this respect it compares unfavourably with mercury and the iodides. No evidence is available that it prevents parasyphilitic or tertiary symptoms. It should only be prescribed for those cases which are intractable to mercury.

Salvarsan for Recurrent Fever. J. Iversen. (*Muench. Med. Woch.*; *Nouveaux Remèdes*, 1911, **28,** 79.) Injection of 0·20 to 0·30 Gm. of salvarsan in fifty-two cases of recurrent fever has completely cured forty-eight in from 7 to 24 hours, and there have been no relapses.

Saponins, Therapeutic Uses of. R. Kobert. (*Pharm. J.*, 1911 [4], **32,** 293.) *Saponin-containing Soaps.*—For patients where the skin is sensitive to soap the amount of the latter used may be considerably reduced by substituting saponin. The stimulating action of the saponins on the skin is a healthy one,

and for this reason saponin soaps have for long been in use in America for washing, shaving, shampooing, and for baths. In France, quillaia tincture is combined with tar preparations for the treatment of chronic dry eczema, but so far the exact domain of the saponins in the treatment of skin diseases remains to be found.

Saponin Baths.—Saponins aid the action of all drugs which stimulate the skin. Since minimal amounts slow the evolution of CO_2, its addition to baths containing this gas is useful. The action of CO_2 baths in anæmia, skin malnutritions, and scrofula, etc., may be improved considerably by the addition of saponin.

Saponin Drinks.—Non-alcoholic drinks if poor in dextrins and sugars, rapidly give off their CO_2, and become insipid and flat. By the addition of a minute trace of a saponin they may stand open much longer without losing their effervescence. Hofmann, the Director of the Hygienic Institute in Leipzig, gives as his opinion that the addition of saponins to foodstuffs may be permitted. The author has found that the neutral guaiacum bark saponin is certainly harmless in the amounts necessary. The free use of certain saponins cannot as yet be considered permissible; the less poisonous must be selected.

Saponin Emulsions.—Saponins emulsify oils, balsam of copaiba, turpentine, tars, etc. By the addition of saponins these emulsions are made much more elegant, finer, and more permanent.

Nose and Throat.—The nasal mucous membrane is stimulated and produces copious thin secretion by the action of very dilute solutions of saponins applied either by irrigation or spray. Zickgraf has treated xeroses of the upper air passages and ozœna with saponins with good results. They are also useful for dry throat catarrh where a liquefying expectorant is indicated. Gargles of warm salt solution to which 10–20 drops of Tr. Quillaiæ have been added may be employed. For mouth washes and tooth powders the addition of quillaia has been general for some time. For 30 Gm. of powder 1 Gm. of Pulv. Corticis Quillaiæ is quite sufficient.

In the intestine saponins are anthelmintic, contact with saponin causes the tapeworm to lose its hold and go weakened lower down the bowel, from which it is removed by the purgative action of the saponin. Other worms with thin cuticles are also sensitive to saponins. How far saponin liniments are of use for parasites on and in the skin must be determined by dermatologists.

Saponins as Diuretics.—In Austria, Herba Herniariæ from *H. glabra*, L., and *H. hirsuta*, L., is employed as a diuretic infusion. So far, in Germany, guaiacum and sarsaparilla have been retained, but, through an error, guaiacum bark has been dropped, and only the internal wood prescribed. The two saponins are in the bark and sapwood, but not in the inner wood, which only contains two resins. It were better, therefore, to substitute Cortex Guaiaci for Lignum Guaiaci. A whole gramme of neutral guaiacum cortex saponin is without untoward effect in man; there is merely a relatively harmless stimulation of the activity of the kidney.

The standardization of the amount of glucosides (saponins) in sarsaparilla would be of value. *Smilax chinæ*, *Hemidesmus indicus*, *Monesia*, and *Panax ginseng* are also alluded to as saponin-containing drugs.

Sarsaparilla, Therapeutic Value of. R. Kobert. (*Pharm. J.*, 1911 [4], **32**, 294.) By far the most important drug of the vegetable anti-syphilitics is sarsaparilla, or, more correctly, the group of popular remedies belonging to the genus *Smilax*. England permits only one species—*Smilax ornata* (Hooker). Many are of the opinion of Cushny (*Text-book of Pharmacology*, ed. iv., 351) that "the drugs of this group are all quite superfluous." Whitla (*Elements of Pharmacy*, ed. viii., 448) remarks: "It is probable that the fresh root possesses properties which render it of value in the treatment of secondary and tertiary syphilitic affections, various skin diseases, etc. The dried root produces no appreciable therapeutic effect." With regard to the decomposition of the active glucosides by drying, there is not the slightest evidence. The author holds that such a change is impossible. Hale White (*Materia Medica*, ed. xi., 617) expresses the opinion that "sarsaparilla is not known to have any physiological action. It is never given alone, therefore we are ignorant of its therapeutical effects. Probably it has none." Similar opinions are expressed in German and French literature. The number of physicians in Europe and the United States who defend Zittmann's decoction and other sarsaparilla preparations is not large, but nevertheless not to be ignored. An important article by O. Tunmann (*Apoth. Zeit.*, 1910, **25**, 475), dealing with this subject, has recently appeared. He cites the import of sarsaparilla at Hamburg as increasing. In 1897, 55,500 kgs. were imported, and in 1909 151,600 kgs. The latter represents a

value of £1,325,000. If this sum is expended annually for no purpose it is high time that it should be spent on more useful remedies. Since none of its adherents use it alone, it is well that we should admit our present faulty knowledge of this popular remedy. The proper course to pursue would be to commence a new era in the investigation of the vegetable anti-syphilitics.

Scopolamine, Action of, on Narcotics. G. Hauckhold. (*Zeits. experiment. Path.*, 1910, **7**; *Nouveaux Remèdes*, 1910, **27,** 534.) Although scopolamine has practically no narcotic action alone, it greatly increases the physiological activity of those drugs which have this action. Small doses of urethane, and of morphine, when combined with minute doses of scopolamine, have their narcotic action increased in a remarkable degree when administered hypodermically to rabbits.

Sucrose in Heart Disease. A. Goulston. (*B.M.J.*, 1911, **2,** 615.) From the physiological experiment in which the excised mammalian heart is kept pulsating by means of perfusion with dextrose solution, the inference was drawn that cane sugar would act as a heart tonic in certain forms of heart disease. In many cases the best results have resulted from a diet containing large amounts of cane sugar.

Thymol as a Prophylactic against Cholera. Rosenel. (*Nouveaux Remèdes*, 1910, **27,** 489.) Thymol acts as a very active bactericide towards the comma bacillus. The author has taken 3 grains daily in keratin capsules without noticing any unpleasant eructations. The fæces, however, had a marked odour of thymol and when these were diluted with peptone solution and inoculated with cholera bacillus the latter would not develop. The above dose taken daily, fasting, is therefore recommended as a prophylactic.

Trigemine as a Dental Analgesic. A. Paul. (*Zahntech. Rund.*; *Nouveaux Remèdes*, 1911, **28,** 25.) Trigemine is by far the most successful remedy for relieving the intense pain of periostitis and pulpitis. After treating the affected teeth with arsenic, the pain persists very often for some hours. If, however, 2 or 3 capsules of trigemine are given, it disappears at once, giving the arsenic time to destroy the nerve. Even in cases of acute periostitis where the pain is so intense that surgical treatment cannot be employed, the administration of

trigemine and the local application of tincture of iodine will give relief, so that the nerve-destroying stopping can be applied. It is equally serviceable in allaying pain after extractions, or in preventing their occurrence when taken before operation. It also acts favourably in cases of abscess and suppurative affections. Taken at night, it ensures sleep, and is thus useful in preparing the patient for subsequent operation.

Vaccines, Preparation and Administration of. T. S. Stewart. (*Pharm. J.*, 1910 [4], **31,** 661, 725.) The preparation and standardization of vaccines; determination of opsonic index; the technique of inoculation; the phenomena following the operation; and the treatment of specific diseases by vaccines, are dealt with.

Viscum album, Pharmacology of. R. Gaultier. (*Nouveaux Remèdes*, 1910, **27,** 463.) Investigations continued since 1906 have confirmed the hypotensive effects of mistletoe. Its action is both regular and sustained. Its use has hitherto been confined to the treatment of congestive hæmorrhages and more particularly to the hæmoptysis of the first stage of tuberculosis. It is worthy of more extended trial, and might be useful to relieve the hypertension of arterio-sclerosis.

Warts of Children, Treatment for. (*Formulary* of *Nouveaux Remèdes*, 1911 [7], **28,** 2.) Every evening apply to the affected parts: Ichthyol, 1; glycerin of starch, 10. Twice daily before meals give: Calcined magnesia, 4 grains; milk sugar, 4 grains; suspended in water. Bathe the parts twice daily with water at 34–35°C., and wipe dry with a sponge.

PHARMACY

DISPENSING

Acacia, Uses of, in Pharmacy. J. L. Lascoff. (*Amer. Drugg.*, 1911, **58,** 67.) The use of acacia is frequently necessary to turn out a uniform, homogenous mixture, and to provide for an equal division of doses, as in the following :—

(1) Acid sodium oleate, 0·1 Gm. ; acid salicylic, 0·1 Gm. ; phenolphthalein, 0·02 Gm. ; menthol, 0·01 Gm. ; M. ft. cap. Mitte No. xx. Sig. : One every 4 hours.

Rub the menthol to fine powder and mix with the salicylic acid and sodium oleate. As soon as the mass begins to liquefy add a few grains of powdered acacia and a few drops of water, followed by one drachm of sugar of milk and the phenolphthalein, when a white mass is obtained, which may be divided into very small capsules.

(2) Oil of turpentine, ℥xx ; powdered acacia, gr. xxx ; compound spirit of lavender, ʒi ; spirit of chloroform, ʒi ; castor oil, ʒi ; water, sufficient to make ʒii.

A satisfactory emulsion cannot be turned out with the amount of acacia prescribed. An emulsion of the castor oil should be made, using at least twice the amount of acacia, then adding the oil of turpentine and other ingredients.

(3) Creosote, 0·12 c.c. ; balsam of tolu, 0·2 Gm. ; M. ft. pil. Mitte No. 50.

It is easy to put this prescription in capsules, but to make pills of it the following method should be adopted : Emulsify the creosote with a little acacia, adding finely disintegrated balsam of tolu, with enough powdered licorice to mass.

(4) Magnesium salicylate, gr. v ; make a compressed tablet. Send fifty doses.

The powder is too fine to compress without granulating, and powdered acacia is necessary for the purpose.

(5) Olive oil, balsam of Peru, āā 60·0 Gm.

These drugs alone will not mix, but if a few drops of castor

oil and a little acacia are first added to the balsam, and the olive oil is then incorporated, a satisfactory mixture will result

Atropine Ointment for Ophthalmic Use. T. Hart. (*Pharm. J.*, 1910 [4], **31,** 727.) In some affections of the eye, the drug is required to act very promptly and strongly. Atropine ointment prepared with the pure alkaloid may not act sufficiently readily, as it is so slightly soluble. The following formula is satisfactory in this respect: Atropine sulphate, 1; glycerin of acacia, 1·5; cerated soft paraffin, 25; soft paraffin, 72·5.

Rub down, on a slab, the atropine sulphate with the glycerin of acacia, then mix with the cerated soft paraffin and finally the soft paraffin. Glycerin of acacia is mucilage of acacia prepared with equal weights of gum and chloroform water, and diluted with half its weight of glycerin. Cerated soft paraffin is prepared with 1 part of yellow beeswax and 14 parts of soft paraffin.

Bismuth and Pepsin Mixtures. S. Hardwick. (*Pharm. J.*, 1911 [4], **32,** 410.) A "soluble bismuth tartrate" has been introduced in the form of scales containing 45 per cent. of Bi_2O_3. This gives a slightly acid solution and is found to be suitable for combination with pepsin. Such mixtures are proved to retain the proteolytic action of the pepsin unimpaired. It is well known that in the usual alkaline bismuth mixtures the pepsin is rendered quite inert. It is suggested that 423 grains of the soluble tartrate should be substituted for 320 grains of bismuth citrate. Cudbear is a suitable colour for such mixtures.

Bismuth Salicylate, Incompatibility of, with Sodium Bicarbonate. G. Elliott. (*Pharm. J.*, 1911 [4], **32,** 70.) Bismuth salicylate liberates CO_2 from $NaHCO_3$. When they are prescribed together in a mixture sufficient of the $NaHCO_3$ should be added to the salicylate in water, and the mixture warmed to dispel the CO_2. The other ingredients are then added.

Calomel and Antipyrine, Incompatibility of. Weidenkoff. (*Pharm. Zeit.*, 1910, **55,** 980.) When antipyrine and calomel are mixed decomposition occurs according to the equation

$$6HgCl + 2C_{11}H_{12}N_2O_2 + H_2O = 2Hg + Hg_2O + 2HgCl_2 + 2C_{11}H_{12}N_2O_2HCl.$$

In the case of an actual prescription in which a small amount

of calomel was thus prescribed, no mercurial intoxication was observed to follow, probably on account of the small dose of toxic substances formed. Still, the attention of practitioners should be directed to the dangerous nature of the incompatibility.

Calomel, Experimental Study of the Supposed Incompatibility of, with the Gastric Secretion, Alkali Chlorides and Vegetable Acids. T. W. Schaefer. (*Med. Press*, 1910, **90,** 359.) A very thorough pharmacological investigation proves that there are no grounds for the prevalent opinion that calomel is converted into $HgCl_2$ in the system, in the presence of certain "incompatibles." It is partially converted by the alkaline secretion of the intestine into grey, black, or red oxides of mercury, which are soluble in alkali. The formation of "sublimate" described by Vulpius (*Y.B.*, **1872,** 142; **1879,** 221) by variouss pharmaceutical manipulations, is contradicted. These papers are considered to be the original and erroneous source of the prevalent idea that $HgCl_2$ may be formed from HgCl by such treatment as prolonged trituration in a mortar with sugars. The statement that $HgCl_2$ is produced by the action of Na_2CO_3 on HgCl is dismissed as a chemical fiction. The reaction which takes place is represented by the equation:

$$2HgCl + 2Na_2CO_3 + H_2O = Hg_2O + 2NaCl + 2NaHCO_3.$$

The formation of $HgCl_2$ from HgCl under the conditions which prevail in pharmaceutical and medical practice is dismissed as a myth. (See also *Y.B.*, **1904,** 114; **1906,** 144; **1907,** 242; **1910,** 210; and *Gen. Index.*)

Calomel and Sodium Chloride, Alleged Incompatibility of. E. Federice. (*Boll. chim. farm.*, 1910, 169; *Zeitsch. allgem. oesterr. Apoth. Verein.*, 1911, **5,** 56.) KI and HgCl are known to react to produce HgI_2 and Hg, but the analogous reaction with NaCl does not occur. The author finds that NaCl, even in considerable excess, does not affect HgCl. A concentrated solution of mercuric chloride, containing 100 Gm. in 160 of water at 15°, may be made, if the corrosive sublimate is first mixed with sodium chloride. A small amount of insoluble matter is left, which cannot be dissolved either by addition of excess of sodium chloride or by heat. This residue was found to be calomel. It thus appears that mercurous chloride is not changed into corrosive sublimate by the action of sodium chloride, and

when mixtures of calomel and common salt give the reactions for $HgCl_2$ the corrosive sublimate must be originally present as impurity in the calomel.

Castor Oil, Palatable. (*Formulary Nouveaux Remèdes*, 1910, **27,** 14.) Saccharin, 0·12 Gm.; oil of peppermint, 5 minims; alcohol, q.s. to dissolve; then add to castor oil, 240 Gm.

Chloral Hydrate and Magnesia, Incompatibility of. D. Macewan. (*Pharm. J.*, 1911 [4], **32,** 257.) The following prescription occurred recently in the practice of a pharmacist: ℞. Syr. chloral, 1 oz.; magnes. pond, 1 drachm; vin. ipecac., 1 drachm; tinct. belladonna, 1 drachm; aquam, ad 6 oz.; Misce. Although no immediate change was evident, the day following the mixture was returned, with the intimation that spirit of chloroform had been dispensed instead of chloral syrup. The mixture smelt of $CHCl_3$. This was found to result from the action of the MgO on the chloral hydrate, $CHCl_3$ and magnesium formate resulting, thus:—

$$CCl_3CH(OH)_2 + MgO = 2CHCl_3 + Mg2COOH + H_2O$$

The difficulty was met by the prescriber omitting the MgO. Moreover, the alkaloids present were liberated by the MgO and carried down by the globules of $CHCl_3$, so that there was a distinct possibility of the patient getting an undue quantity of these in the last dose.

Cocaine Hydrochloride, Isotonic Sterile Solutions of. M. J. Schroeder. To be isotonic and therefore painless for injection, solutions should contain from 0·1 to 0·3 per cent. of the hydrochloride and 0·85 per cent. of NaCl. Such solutions may be boiled for 5 minutes or may be heated in a steam-bath to 100°C. for an hour without being decomposed. Sterilized solutions thus prepared may be kept for a prolonged period.

Collyria, Microbian Alteration of. R. Guyot. (*Bull. Soc. Pharm. Bordeaux*, 1910, **50,** 387.) The author notes that dilute solution of zinc sulphate is specially prone to be affected by growth of moulds. Also that weak alkaloidal solutions kept for some time are also very liable to similar growths, especially those which cannot be sterilized by heating. Even when this can be done, they often afterwards become re-infected through the dropper. Special attention should be directed to maintaining this in a sterile condition during use. A collyrium of $ZnSO_4$

and cocaine, which did not give the relief expected, was found to be crowded with the following growths: *Mucor mucedo*, *M. racemosus*, spores and mycelium of *Aspergillus*, and also *Torulæ*. The addition of a little cherry laurel water as a preservative is advocated; 2 or 3 drops suffice, and this quantity does not cause irritation. (But see *Y.B.*, **1906,** 243.)

Cusylol Preparations. (*Pharm. Zentralh.*, 1911, **52,** 542.) Cusylol is said to be a compound salt of copper citrate and sodium borocitrate. It is a blue, hygroscopic powder, soluble 1 : 1 in water; insoluble in EtOH and in Et_2O. It is used for eye diseases, and venereal affections. Solutions from 2 to 10 per cent. are prescribed, and ointments containing from 0·5 to 5 per cent. Also a compound powder for use in ointments is made with cusylol, 5; amorphous copper citrate, 50; sodium chloride, 8; sodium borocitrate, 4. From 5 to 10 per cent. "ointment" is prepared with this, using a glycerol of starch bases, the "*Unguentum glycerini*" Austr. Pharm. VIII. This is made by rubbing down wheat starch, 10; water, 20; glycerin, 100, and heating the mixture to 110°C., stirring to a uniform mass. The following mixture is prescribed as a dusting powder when 1 part is mixed with 4 parts of indifferent sterile powder: Amorphous copper citrate, 20; sodium borocitrate, 1; sodium chloride, 3.

Digitalis Infusion, Improved Formula for. P. E. Hommell. (*Merck's Report*, June,1911; *Pharm. J.*, 1911 [4], **32,** 848.) Digitalis leaves, bruised, 15 Gm.; alcohol, 100 c.c.; glycerin, 50 c.c.; boiling water, 500 c.c.; aromatic water, sufficient to make 1,000 c.c. *Aromatic Water.*—Oil cinnamon, 50 c.c.; oil nutmeg, 50 c.c.; oil coriander, 50 c.c.; oil caraway, 50 c.c.; purified talc, 15 Gm.; distilled water, sufficient to make 1,000 c.c.

Patients often complain of the nauseous taste and derangement of the digestion with the ordinary infusion. The above aromatic preparation modifies these objectionable features.

Dispensing Difficulties. J. L. Lascoff. (*Amer. Drugg.*, 1910, **57,** 367.) *Darkening from faulty method of mixing.*—℞. Corrosive sublimate, 0·1; potassium iodide, 12·0; syrup of ferrous iodide, 20·0; distilled water, ad 90·0; M. et Sig.: Teaspoonful three times a day in water.

The discolouration occurring with this prescription is due to the alkalinity and occasional impurity of the potassium iodide.

If not properly compounded a cloudy and brownish precipitate would develop. The proper method of mixing the ingredients was to first dissolve the KI in a small quantity of water and mix the solution with the syrup of FeI_2. The $HgCl_2$ should be dissolved separately in a little water and added little by little to the solution first formed, sufficient water being afterwards added to make a 3 oz. mixture. Compounded in this way it formed a light greenish coloured solution.

Oleoresins in watery mixtures.—℞. Fluid extract of cubeb, 8·0; tincture of hyoscyamus, 12·0; potassium citrate, 24·0; distilled water, 60·0; glycerin, 24·0. M. et Sig.: Teaspoonful every 3 hours in water.

The glycerin here prescribed is insufficient to hold the resinous extract in suspension. The potassium citrate should be dissolved in a little water, adding the tincture and the fluid extract, and emulsifying with a small quantity of acacia and glycerin.

Silver preparations with cocaine salts.—℞. Protargol, 2·0; cocaine hydrochloride, 0·5; distilled water, 60·0. Solve et Sig.: For external use.

The precipitation of AgCl is avoided by substituting an equivalent amount of cocaine nitrate for the hydrochloride.

The liquefaction of salol and antipyrine in combination.—℞. Pyramidon, 0·3; antipyrin, 0·2; salol, 0·12; codeine, 0·01; caffeine citrate, 0·06. M. Fac. capsulas No. xii. Sig.: One every 2 hours as directed.

If this prescription was dispensed in the order in which it was written the mass would quickly liquefy and the capsule would not be fit to take. By triturating the salol, codeine and caffeine in a mortar separately, with the addition of two grains of sugar of milk to a dose; then triturating gently the antipyrine with the first mixture, and at last the pyramidon, it forms a nice, white, dry powder which keeps any length of time after dispensing in capsules.

Mustard chloroform liniment.—℞. Oil of mustard, gtt. xl; menthol, 2·0; chloroform, 20·0; petrolatum, 40·0. M. et. ft.: Unguentum. Sig.: Rub in very briskly.

In compounding this prescription it would be best to liquefy the petrolatum by heat, and when it was cooling add the oil and menthol previously dissolved in the chloroform.

Ichthyol pills.—When ichthyol is prescribed in pill form, ammonium ichthyol should be evaporated on the water-bath to pilular consistence.

Terpinol mixture in capsules.—Difficulty was experienced with the following prescription: Terpinol, 6·0; sodium benzoate, 6·0; heroin, 0·1; powdered licorice extract, 4·0. M. et divide in caps. No. xxiv. White specks of sodium benzoate invariably show in the capsules. To prevent this the terpinol is massed with MgO and the benzoate, dissolved in a few drops of water, added to the mass. The colour becomes brownish, but no white specks show.

Danger of oleoresin of male fern with castor oil.—The following prescription received in practice is a type of bad prescribing: R. Oleoresin of male fern, 4·0; oil of turpentine, 2·0; castor oil, 60·0. M. et Sig.: Use at one dose. Oil of male fern should never be prescribed together with castor or other oils; or if prescribed should not be dispensed without reference to the prescriber. It has been frequently shown that an oily substance administered simultaneously with the male fern extract greatly increased the toxicity of the latter. Cases of permanent total blindness following optic neuritis from this dose have been recorded. In some countries this prescription is illegal. The castor oil should be prescribed to be taken after the male fern mixture, and should be dispensed separately.

Guaiacol carbonate and menthol tablets.—The following prescription: Guaiacol carbonate, 2 grains; menthol, $\frac{1}{6}$ grain; eucalyptol, $\frac{1}{6}$ grain, when properly prepared was found to give a friable tablet when prepared with gentle pressure. It had been compounded with the addition of MgO, when a stone-hard tablet resulted, which had passed intact through the patient's intestines.

Dispensing Notes and Queries. W. Duncan. (*Pharm. J.*, 1911 [4], **32**, 44.)

The following mixture becomes decolourized. R. Tinct. iodi., $\frac{1}{2}$ dr.; acid hydrocyan. dil., $\frac{1}{2}$ dr.; vin. ipecac., 3 dr.; aq. ad 3 oz. Iodine and HCN react to form ICN and HI, both soluble, colourless bodies. In this mixture, however, there will probably be further changes, interaction of the KI of the tincture and the I with the alkaloids of the ipecacuanha followed by precipitation.

R. Zinci chlorid., 1 dr.; aquæ, 1 oz. Sig.: The paint for the throat. Should this be filtered, cleared with acid, or sent out with a "shake" attached? The B.P. describes zinc chloride as "almost entirely soluble in water," suggesting that the correct way is to attach a "shake" label. Zinc chloride of com-

merce is said to contain some basic salt. The author always clears the solution by the addition of a trace of HCl. First, because no pure haloid zinc salt yields a clear solution with water, but an opaque one, from hydrolysis and the formation of insoluble zinc hydroxide, the opacity depending on the extent of the dilution. Second, because all prescribers consulted are under the impression the salt is entirely water-soluble, and expect a clear solution.

What is the reason of the following mixture becoming yellow? ℞. Potass. iodid., 1 dr.; ammon. chlorid., 2 dr.; sp. chloroform, 3 dr.; aquæ, ad 6 oz. The two salts interact, and the NH_4I liberates a little acid which, by the combined action of air and sunlight, will break down into water and iodine, hence the colour. If the mixture be made faintly alkaline it will remain colourless as long as the alkalinity is maintained.

What is the precipitate in Lin. Opii., B.P.? It appears to be large, but does not weigh more than 20 grains from a pint of liniment. It is a complex mixture of calcium and potassium meconates with resinous matter, but no morphine.

℞. Liq. trinitrin, 1 ♏; pepsin, 1 gr.; ext. nucis vom., ext. bellad., āā ½ gr.; extract gent., q.s. Ft. pil., m.t. xxiv. How should the above be dispensed? They could be made by using the equivalent quantity of strong tablets. Failing this, place 2 or 3 grains of cacao butter in a suitable capsule, add the liquor, and cautiously, with stirring, evaporate the alcohol. When cold mass with the pepsin and other ingredients, replacing the extract of gentian by powdered gentian.

The following was said to have exploded. Was this possible? ℞. Ferri et ammon. cit., 80 gr.; potass bicarb., 1½ dr.; magnes. sulph., ½ oz.; glycerin, ½ oz.; aq., ad 8 oz.; M. Not only possible, but almost certain. First, Ferri et ammon cit. is frequently acid from over-heating in the concentrating or scaling. And, secondly, $MgSO_4$ and $KHCO_3$ solutions always give free CO_2 from the breaking down of the magnesium bicarbonate.

℞. Sulphonal, 3 dr.; pulv. trag. co., 1 dr.; aq. chloroform, ad 3 oz. Why does this develop a disagreeable odour? This has been kept for six months, and no disagreeable odour has been detected. If it occur the Pulv. Trag. Co. should be examined, and especially the starch of it for alkalinity.

Is one justified in dispensing Tinct. Lobeliæ Ætherea, when Tinct. Lobeliæ is ordered? Dispense the 1885 Tinct. Lobeliæ unless the prescriber prefers the present preparation.

What causes the yellow colouration in the following? R. Potas. iodid., ½ dr.; sodii nitritis, 6 gr.; tinct. nucis vom., 2 dr.; saccharin, 2 gr.; aq. anethi, ad 6 oz. It is due to the saccharin liberating nitrous acid from the $NaNO_2$, which acid sets free a portion of the iodine of the KI.

R. Potas. chlorat, 1 dr.; liq. strychnin, 1 dr.; quin. hydrochlor., 16 gr.; acid carbol. liq., 40 m.; liq. arsenici hydr., 40 m.; sp. chloroform, 3 dr.; aq. cinnam, ad 8 oz.; Ft. mist. Practically each ingredient in this mixture is incompatible with its neighbour, even the chloroform spirit and cinnamon water. The chief offenders are the chlorate, the quinine, and the carbolic acid. Soon after mixing the mixture becomes milky-like, clearing up as the precipitated quinine chlorate passes into the crystalline condition, much of the crystalline tufts remaining suspended. Probably suspension by a little gum is the better plan to adopt here.

How should this be dispensed? R. Liq. plumb. subacet., 1 oz.; glycerin, ½ oz.; acid. carbol., ½ oz.; ol. olivæ, 4½ oz. Sig.: The application. Triturate the glycerin and carbolic acid together, add the oil, and finally the liquor, send out in a wide-necked bottle, and attach a "shake."

R. Acid. nit. hyd. dil., 2 dr.; tinct. nucis vom., 40 m.; liq. bism. et am. cit., ½ oz.; infus. calumbæ, ad 8 oz.; Mix. The precipitate formed in this is bismuth citrate—from the acid withdrawing the ammonia from the water-soluble bismuth salt, the removal of which causes the precipitation of the insoluble citrate.

Dispensing, Practical Notes on. H. Wyatt. (*Pharm. J.*, 1910, **31,** 643.) The following are selected from a number of notes on dispensing difficulties actually occurring in practice. *Serum in Mixtures.*—The oral administration of sera and vaccines is frequently employed. When sera are prescribed in mixture form some preservative must be used. Glycerin, alcohol, and chloroform water are the three best adapted to the purpose, but in the case of alcohol or an alcoholic tincture not more than 25 per cent. should be used, or the serum may be precipitated. Examples of these prescriptions are the following:—

(1) R. Seri antithyroidi Moebius, ♏320; sp. vini rect., ʒi; glycerini, ʒiv; aquæ, ad ʒiv.; M. ft. mist. ʒij ter die. Dilute the serum with the glycerin and half the water, and pour into the alcohol diluted with the rest of the water.

(2) ℞. Vaccini pneumococci, 1 c.c. = 10,000,000, ♏xviij ; glycerini, ʒi ; aq. chorof., ad ʒvj ; M. ft. mist. ʒss quaque secunda hora.

Nitrites.—A frequent difficulty is where a nitrite is ordered with an acid, causing liberation of nitrous acid, as in the following :

(1) ℞. Potass. iodidi, 48 gr. ; sodii nitritis, 12 gr. ; liq. nitroglycerini, ♏vj ; sodii benzoatis, 72 gr. ; syr. zingiberis, ʒvj ; aquæ, ad ʒvj. ; Ft. mist. With 20 grains sodium bicarbonate added to keep the mixture alkaline no change of colour occurs, even on keeping.

(2) ℞. Theocin sodii acetatis, 5 gr. ; caffeinæ citratis, 4 gr. ; sodii nitritis, 2 gr. ; for 1 cachet. Half the amount of caffeine is used instead of the citrate, and the nitrite rubbed down with dried sugar of milk. The cachets keep well.

Senega as emulsifier.—The use of senega as an emulsifying agent is not so general among prescribers as it should be. The following formulæ show its use :

(1) ℞. Paraldehydi, ʒiij ; syrupi, ʒiv ; tinct. aurantii, ♏xxx ; liq. senegæ, ʒj ; aquæ, ad ʒiii ; ʒj for a dose. This shakes up easily and is less viscous than a mucilage emulsion.

(2) ℞. Liq. morph. mur., ʒij ; tinct. camph. co., ʒij ; vini ipecacuanhæ, ʒij ; glycerini, ʒiv ; chloroformi, ♏xv ; liquoris cocci, ♏v ; aquæ, ad ʒiv ; M. ft. Mistura. This gives no trouble if the $CHll_3$ is emulsified with 1 drachm of Liquor Senegæ.

(3) ℞. Pot. chloratis, ʒij ; tinct. myrrhæ, ʒij ; inf. senegæ, ʒij ; aquæ, ad ʒvj ; Ft. Gargarisma.

Order of Mixing.—This is a cause of variation in the colour of some mixtures and of the density of precipitates occurring in others.

(1) ℞. Ext. cinchonæ rubræ liquidi, ʒiv ; auri chloridi, 1 gr. ; inf. gent. comp., ad ʒviij ; M. ft. mist. If the gold salt, diluted with 2 oz. of the infusion be added to the mixture last, the precipitate is bulky and light coloured, but if the process is reversed the precipitate is purplish and very dense.

(2) ℞. Calcii glycerophosph., ʒij ; sodii cinnamatis, 20 gr. ; acidi phosph. dil., ʒj ; liq. atrop. sulph., ♏viij ; glycerini, ʒj ; inf. aurantii comp., ad ʒiv ; M. ft. mist. St. ʒj ter die. Dissolve the sodium cinnamate in infusion, q.s., then add to the glycerin ; add to this the calcium glycerophosphate with the acid, and make up with the rest of the ingredients. In this way the cinnamic acid thrown out is very finely diffused, and requires no suspension.

(3) R. Sodii salicylatis, ʒiij ; potass. bicarb., ʒj ; tinct. guaiaci ammon., ʒiv ; emulsionis petrolei, ʒij ; aquæ chloroformi, ad ʒviij. M. ft. mist. Make a saturated solution of the salicylate in chloroform water ; add the tincture of guaiacum little by little, and pour the mixture into the emulsion, shaking well; finally add the bicarbonate, dissolved in the rest of the chloroform water. The salicylate dissolves the guaiacum resin and makes a very smooth mixture.

Catheter oil.—The following is a satisfactory formula for catheter oil with silver nitrate, 4 gr. to fl. ʒj. R. Nitratis argenti, 4 gr. ; sp. vini rect., ʒiss ; olei ricini, ad fl. ʒj ; M. ft. Solutio.

Cocaine hydrochloride and HgO.—An eye ointment of the following composition proved extremely irritating :—R. Hyd. ox. flav., 2 gr. ; cocainæ hydrochl., 2 gr. ; acidi borici, 4 gr. ; vaselini flavi, ʒiv ; Ft. Ungentum. This is due to formation of $HgCl_2$. On substituting cocaine alkaloid dissolved in castor oil, ♏xx, by aid of heat, no irritation occurred.

Suspension of boric acid.—Lotions like the following are often prescribed in Liverpool, but are less frequent elsewhere. R. Acidi borici, ʒvj ; ext. opii liquidi, ʒij ; aquæ rosæ, ʒiv ; aquæ, ad ʒviij ; M. ft. Lotio. Use with equal amount of warm water. The prescriber intends a saturated solution of boric acid containing undissolved acid in suspension to be used. If the finely crystallized boric acid known to Continental pharmacy as "paillettes" be used, it diffuses readily with a shake and rapidly dissolves, even in cold water, when diluted.

Ereptone Nutritive Enemata. K. Brandenburg. (*Apoth. Zeit.*, 1911, **26,** 15.) Ereptone, 20 Gm. ; maltose, 20 Gm. ; water, 200 Gm. Dissolve. This to be administered three or four times a day as a rectal injection. Ereptone is claimed to be superior to peptone for rectal feeding, since it does not contain any substances which irritate the intestinal mucous membrane. It is obtained by the successive action of pepsin, trypsin and erepsin on lean meat.

Excipient Powder, General, for Pills. L. Danzel. (*Bull. comm.*, 1911, **39,** 193.) Powdered licorice root, 40 ; powdered tragacanth, 20 ; powdered almond oil soap, 20 ; wheat groats flour, 12 ; powdered sugar, 6 ; hydrated magnesia, 6 ; mix. This powder may be used alone to mass liquids or viscous substances. To mass powders, a little should be intimately mixed, then massed with honey or with gum julep.

Ferrous Chloride in Pills. J. D. Watson. (*Pharm. J.*, 1911 [4], **32,** 69.) The prescription, "Ferri Protochlor., 2 gr.; aloin, $\frac{1}{12}$ gr.; Ft. pil. mitte 12, has given some trouble. The best results were obtained by massing with anhydrous lanoline and adding 3 grains of althea powder.

Infusions, Concentrated and Fresh, A Comparison. T. Stephenson. (*Pharm. J.*, 1911 [4], **32,** 255.) The author condemns the use of concentrated infusions in all forms. The "infusion" prepared from the concentrated 1 : 7 commercial preparation is totally different in colour and other characters from the fresh infusion made in the proper manner. The differences are shown in the following tables.

Name of Infusion.	B.P. Fresh Infusion. Colour.	Specific Gravity.	Extractive per cent.	"Infusion" from "Conc. 1-7." Colour.	Specific Gravity.	Extractive per cent.
Aurantii . .	Pale yellow .	1·006	1·21	Dark brown	1·002	1·32
Buchu . .	Pale yellow .	1·002	0·56	Brown-yellow	0·999	0·64
Calumbæ . .	Pale yellow .	1·004	0·68	Brown-yellow	0·998	0·42
Cascarilæ . .	Brown-yellow	1·002	0·43	Brown . .	0·997	0·23
Digitalis . .	Green-yellow	1·004	0·34	Green-brown	0·997	0·21
Cinchon. Acid.	Yellow-brown	1·004	0·70	Darker tint .	1·002	1·4
Gentian. Comp.	Pale yellow .	1·002	0·53	Brown-yellow	0·998	0·51
Quassiæ . .	White . .	1·000	0·107	Pale yellow .	0·996	0·05
Rosæ Acid .	Bright red .	1·005	1·05	Red to brown	0·999 to 1·005	—

The fresh B.P. infusions alone should be used for dispensing.

Infusions, Aseptic. A. Currie. (*Pharm. J.*, 1911 [4], **32,** 106.) Concentrated infusions of calumba and quassia are prepared by simply evaporating the fresh infusion to one-eighth, filtering and adding 4 minims of formaldehyde solution to each fl. oz. For dispensing the requisite quantity is boiled to drive off the formaldehyde and diluted to the necessary volume. Infusion of gentian is made from the root alone, and concentrated. To each fl. oz. of infusion 6 minims of essence of lemon (1 of oil in 10 of S.V.R.) and 24 minims of tincture of orange and 4 minims of formaldehyde solution are added. Infusion of senega is also concentrated by evaporation, 5 grains of $KHCO_3$ being added to each fl. oz. of the concentrated infusion.

In each case the formaldehyde is driven off by boiling the concentrate before dilution.

Injections, Sterilization of. A. Lesure. (*J. Pharm. Chim.*, 1911, **3,** 63, 108.) The subject is dealt with very fully: each substance which is much prescribed as injection is dealt with. The importance of the use of alkali-free glass vessels is emphasized. With this precaution the majority of the preparations may be heat sterilized in the autoclave. Ultra-violet rays are not serviceable for pharmaceutical use in this direction. (See also *Y.B.*, **1910,** 258, 265.)

Licorice, Liquid Extract, Incompatibility of, with Calcium Chloride and the Alkali Chlorides. G. Elliott. (*Pharm. J.*, 1911 [4], **32,** 258.) In the prescription: ℞. Calcii chloridi, 1½ dr.; ext. glycyrrhizæ liq., 2 oz.; aquam, ad 4 oz., an immediate bulky precipitate is formed which cakes on the bottom and sides of the bottle. It is found that liquid extract of licorice is invariably and normally acid, and that a more presentable mixture is obtained by first neutralizing this acidity with AmOH. The precipitation is considered to be due, in part, to the interaction between the $CaCl_2$ and the potassium glycyrrhizate, calcium glycyrrhizate being less soluble. Glycyrrhizin was prepared by the method of Tschirch and Cederberg (*Y.B.*, **1907,** 73) and found to precipitate with $CaCl_2$. It was found that the chlorides of the alkalies also cause precipitation, the bromides to a less degree, and the iodides least of all. As a general principle it is suggested that all distinctly acid liquid extracts should be first neutralized with AmOH before being used for dispensing.

Mercuric Iodide, Oily Solutions of, for Injection. H. A. B. Dunning. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1123.) The following 0·4 per cent. solution of HgI_2 is prescribed by American physicians: Mercury biniodide, 0·2 Gm.; anæsthesin, 0·1 Gm.; oil of sesame, 50·0 Gm. Triturate the finely powdered solids with a small portion of the oil to a smooth paste, then add the remainder and mix thoroughly. Introduce into suitable container, and heat in water, shaking frequently until solution has been effected, filter while hot, pour into a glass-stoppered bottle, then sterilize by immersing in water and heating to boiling for 1 hour. The author has prepared the following stronger solution: Mercury biniodide, 0·50 Gm.; castor oil, 18·0 c.c.; olive oil, 32·0 c.c. Proceed as above.

After several weeks the latter product shows, sometimes, a slight separation of mercuric iodide. Probably a mixture of equal volumes of castor oil and olive oil would give a more permanent solution.

Metric Prescriptions. (*B.M.J. Supplement*, **1, 1911,** 204.) The Council of the British Medical Association advocate the gradual introduction of the metric system into prescribing, and for this purpose gives numerous illustrations of ordinary and metric prescriptions. The procedure recommended is thus summarized :—

(*a*) The prescription is still to be based on the single dose.

(*b*) In the case of mixture 16 doses are to be ordered by writing with figures only the number of grains or minims of each ingredient in one spoonful.

(*c*) In the case of pills and powders 10 are to be ordered, and the prescription is to give in figures only the metric equivalent of the grains of each ingredient in the single dose.

(*d*) The dispenser is to be informed that every prescription written without symbols is to be dispensed in metric measures.

In order to carry out the suggestions, it is necessary that there should be some definite understanding between medical practitioners and pharmacists. It is suggested that this might be done locally where a district may be ripe for the step, by the co-operation of the executive committee of the B.M.A. of the division, and members of the local Pharmaceutical Association. It is further recommended that the teaching both theoretical and practical in pharmacology and materia medica should henceforth be according to the metric system.

Nutritive Suppositories. Boas. (*Nouveaux Remèdes*, 1911, **28,** 29.) The use of nutritive suppositories is considered to be much preferable to the employment of enemata for rectal feeding. Albumin (especially crystalline ovalbumin) with NaCl, dextrin, and an emulsified fat, preferably cacao butter, are the best ingredients. A suppository 6 cm. long and 1 cm. in diameter, weighing 11 Gm., and having the following percentage composition : Water, 20·51 ; mineral salts, 2·49 ; fat, 20·09 ; carbohydrates, 33·55 ; albumin, 23·36, will represent 46·2 calories or 230 calories for five such suppositories a day. To supply the water needed, 500 c.c. of physiological salt solution is injected in the morning before the first suppository, and again at night, after the last. These suppositories are generally almost entirely

absorbed in 3 to 4 hours, and the general condition of patients fed with them compares favourably with those treated with nutritive enemata.

Percentage Prescriptions. E. O. Rowland. (*Pharm. J.*, 1911, 3, **32**, 372.) Various aspects of the percentage prescription and some problems it presents are ably discussed and illustrated by examples.

Peruvian Balsam Emulsion. J. D. Watson. (*Pharm. J.*, 1911 [4], **32**, 69.) The following prescription had to be dispensed: Bals. Peruv, 2 dr.; syrup tolut, ½ oz.; tinct. camph. co., 90 m.; aq. ad. 4 oz. A mucilage was made with powdered acacia, 2 dr., and water, 3 dr. The balsam was gradually added to this, then emulsified. More water, then the tincture and the syrup were added.

Phenalgin, Incompatibility of, with Aceto-Salicylic Acid. G. Elliott. (*Pharm. J.*, 1911 [4], **32**, 70.) Phenalgin, stated to be phospho-ammonio phenyl-acetamide, has a distinct odour of free ammonia. When prescribed with aceto-salicylic acid, in a powder, it forms a pasty mass.

Protargol, Method of Making and Using Warm Solutions. — Chrzelitzer. (*Apoth. Zeit.*, 1910, **25**, 731; *Bert. klin. Woch.*, 1910, 1706.) The prescribed quantity of protargol should be added to some cold (sterilized) distilled water, and set aside for 30 to 60 minutes, without stirring, when solution will be complete. This is then added to the requisite quantity of distilled water, previously warmed to 45°C., in the irrigator. It is then used at once. The solution once made should never be warmed up several times by standing it in hot water, the quantity of solution should be freshly made for each irrigation. The temperature indicated is found to give the best results.

Quillaia Tincture as an Emulsifier. G. Elliott. (*Pharm. J.*, 1911 [4], **32**, 70.) The addition of 1 dr. of tincture of quillaia gives a good emulsion, on shaking, with the following prescription: Terebene, 1 dr.; tinct. camph. co., 3 dr.; spt. ammon. aromat., 4 dr.; aq. ad. 3 oz.

Salvarsan Injections. W. H. Martindale and W. Wynn Westcott. ("*Salvarsan*" *or* "606," pp. 21–38.) *Dosage.* 0·5 Gm. may be taken as a rule as a sufficient intramuscular

or subcutaneous dose, but larger amounts (0·6, 0·7, 0·8 Gm. up to even 1 Gm.) are advocated for strongly-built adult males, according to nature of the case. For women 0·45 up to 0·5 Gm. is generally sufficient. For exceedingly weakly patients a dose of 0·3 to 0·4 Gm. is suitable. For children 0·2 up to 0·3 Gm. is suitable, and infants have received injections of 0·02 up to 0·1 Gm. with good result. *Suspensions or solutions for use must be freshly prepared, or grave consequences may result.*

The *highest dose* employed by Schreiber and Hoppe in 300 cases was 0·0096 Gm. per kilo body weight. A 12-stone man would therefore receive at most 0·8 Gm. It is doubtful, according to them, whether 0·6 to 0·7 Gm. suffices to cure in one dose—so far this was used without danger. Much higher doses than 0·8 Gm. have been used.

It is a difficult matter to determine a dose for "606" that shall be active and yet safe. Ehrlich says that Alt, to whom he first gave the substance for trial, uses only 0·3 to 0·4 Gm. The original trials by Alt were with 0·3 Gm. of the substance. This quantity is well mixed with about 10 c.c. of sterile water. Two to 2·3 c.c. sterile N/1 NaOH solution are added so as to leave a small portion undissolved. It is then diluted to 20 c.c. with water, adding a small quantity of eusemin as anæsthetic, the dose being 10 c.c. into each gluteal muscle.

Ehrlich in a recent communication says in the case of nerve diseases 0·4 Gm. should be considered a maximum, but in ordinary syphilitic affections, especially primary cases, 0·7 to 0·8 Gm. should be given, and even higher than this, or by repeated dose—the main issue is to counteract infection as rapidly and completely as possible.

Repetition of dose.—In some cases there seemed to be an arrest of improvement after 0·3 Gm.—hence an increased dosage at fortnightly intervals—e.g., 0·4 Gm. as first dose, then 0·6 to 0·7 after 14 days, then 0·9 to 1 Gm. after a further fortnight's interval, has been adopted.

Wechselmann states that it is quite safe to re-inject salvarsan, if necessary, eight days after the first dose; obviously it would be better to wait if possible, for three or four weeks, so that the centres of attack may be in a quiescent state ready for the fresh dose.

Neisser says: "In four weeks a total of 2·4 Gm. in three doses may be reached, but on account of the slow elimination there is possibility of cumulative toxic effect."

Intramuscular Injections. *Ehrlich's Original 1 per cent. Intramuscular Injection.*—Dissolve 0·6 Gm. of the substance in ethylene-glycol, 3 c.c., by rubbing with a glass rod—addition of a few drops of water will assist solution. Now add water, 12 c.c., shake and add (in one portion) 10·3 c.c. of N/5 NaOH. Shake (a clear liquid is now formed) and make up to 60 c.c.—the entire process may well be done in a graduated cylinder. This solution has been superseded by later formulæ. It contains insufficient alkali to completely set free the base.

A Subsequent Formula by Ehrlich.—0·4 to 0·5 Gm. of "606" is mixed with ½ to 1 c.c. of methyl alcohol, dissolved in water with addition of 5 to 8 c.c. of N/10 NaOH (or q.s. to saturation) and diluted to 25 or 30 c.c. with water. This produces a clear yellow solution, half to be injected into each gluteal muscle.

Schreiber and Hoppe's Intramuscular Injection.—Moisten 0·6 to 0·7 Gm., the single dose, with about ½ c.c. of methyl alcohol in a 150 c.c. cylinder. Add about 10 c.c. of sterile water and shake thoroughly, then add sterile N/1 NaOH solution in sufficient quantity to almost completely dissolve the substance with thorough shaking. Shaking is important to promote reaction and prevent excess being added. About 3·5 to 4 c.c. will be required. Add water, q.s. to 60 c.c. and inject this solution, 30 c.c. into the right gluteal muscle and 30 c.c. into the left, using as fine a needle as possible with the slightest possible amount of pressure. (A brownish insoluble portion rapidly settles to the bottom of the solution and may be rejected before use; by so doing there is no danger of blocking the needles.) This injection would be alkaline to test paper.

Wechselmann's Injection.—Wechselmann employed intragluteal and subcutaneous injections. First of all he used the dihydrochloride dissolved in a little methyl alcohol or glycol; this was mixed with 10 c.c. of water, and then 1 to 2 c.c. N/10 NaOH added and finally made up to 25 c.c. with water. The "strongly acid" solution was injected. Later he added enough alkali to form the monohydrochloride—(i.e., until slight opalescence was visible), and finally he has utilized a *neutral* suspension. For this he adds N/10 NaOH until the reaction is *alkaline* to phenolphthalein. He then neutralizes with acetic acid. This forms a slightly opalescent neutral painless injection.

A still further modification by Wechselmann and Lange, is to dissolve the dose in 1 to 2 c.c. sodium hydrate solution (15 per cent. by weight), to precipitate with glacial acetic

acid added drop by drop, to collect the precipitate, and *suspend* it in 1 to 2 c.c. distilled water, adding either N/10 NaOH or 1 per cent. acetic acid, whichever is necessary to neutralize, to litmus paper. This is quite painless for intramuscular use and for subcutaneous injection below the shoulder blade. The suspension may also be *centrifugalized*, the liquor rejected, and the yellow precipitate suspended in physiological salt solution. This is then ready for injection. The injection often causes inflammation, which heals with induration and thickening. The danger attending its use is small. Alt does not approve of the addition of methyl alcohol, the use of phenolphthalein as indicator, and the suggestion to dissolve in excess of alkali and titrate back with acid, etc. All this, he says, had been tried by Ehrlich long ago. Acid solutions are *poisonous*.

Alt's Intramuscular Injection.—Alt's more recent directions are to place 30 moderate sized glass beads (the glass beads are hardly necessary) in a 100 c.c. stoppered graduated cylinder, to add 10 c.c. of distilled water and then the powder. By slight shaking the substance is easily dissolved. For every 0·1 Gm. of the substance add about 0·5 c.c. normal NaOH and shake again energetically for about half a minute. This forms a perfectly clear and slightly alkaline solution which can be diluted as desired (20 to 30 c.c.). The preparation does not always require *the same quantity of NaOH*. By this method the smallest quantity of NaOH is used, and hence produces the least pain. If more than 20 to 30 c.c. of solution for 0·3 Gm. of substance be used the feeling of tension is greater on the first day on account of the greater pressure, but disappears more quickly. According to Alt, much less of the substance produces a reaction than when an alkaline solution is used.

Michaelis's Intramuscular Injection (*modified by Spiethoff*).—An emulsion of 0·6 Gm. in 9 to 10 c.c. of vehicle. First a hot solution of "606" in about 8 c.c. physiological salt solution is prepared. This is made alkaline with concentrated NaOH solution (about 3 drops), in presence of phenolphthalein—then the excess of alkali is removed by a drop or two of strong acetic acid, finally rendering alkaline again with N/1 NaOH at the bedside immediately before use. An important point in this method is the reduction of the volume of the injection to about 9 or 10 c.c., which is said to lessen the pain. The injection may be made for the patient's comfort on *one side only* into the gluteal

muscle, selecting the side on which patient is not in the habit of resting.

As a general rule, after an intramuscular injection the patient should remain lying on his abdomen for a while.

A *suspension in liquid paraffin* has also been used—injected into the gluteal muscles. This requires a needle with fairly large lumen. Taege, on the other hand, says *oil suspensions* like those used in mercurial injections, are unsuitable—they are too thick, unless one uses large quantities of oil.

Injections of "Acid" Preparations.—Duhot prefers a complete solution of the substance to a suspension, as this is more likely to produce the "complete sterilization of the system." Pain is kept down by reducing the volume of the injection from 8 c.c. to 5 c.c. also by injecting high up in the outer hip region, in place of the deep injections into the buttock. His directions are simply: Rub the powder with $\frac{1}{2}$ c.c. of methyl alcohol in a glass mortar, then add 4 to 6 c.c. normal saline. He injects the dose with a 5 c.c. "Record" syringe, which is provided with a platinum needle 2 to 4 cm. in length.

Taege prepares his solution as follows: The contents of tube is shaken into a dry sterilized test tube. Glycerin is added in proportion of two drops to each 0·1 Gm. of the substance. Mix intimately, breaking up particles at the same time. To this add a sufficiency of freshly boiled (hot) water from a test tube, and dissolve with aid of a glass rod. Injection is then ready for use. Inject in one spot only, deeply into the gluteal muscle.

Subcutaneous Injections.—The best place for this method of injection is about midway between spine and lower end of the shoulder-blade. Injections in the chest are also made—in man into a fold of tissue below the nipple, in women below the mammary gland. Subcutaneous injection is not so suitable as intramuscular where the skin is taut—e.g., in young people or in emaciation.

Blaschko's Method.—A 0·5 Gm. of the dihydrochloride requires 0·45 Gm. of 20 per cent. by weight NaOH solution = 0·36 c.c., sp. gr. 1·25. By use of only the necessary quantity of alkali, and finally a drop or two of acetic or hydrochloric acid, one produces a more satisfactory injection. Dilute the dose to only 8 or 9 c.c. This is said to produce a salt solution approximating that of physiological salt solution, in which the base is suspended, or even 5 c.c. will suffice, as the NaCl solution so made is said to be not too hypertonic to be painful.

The following (*b*) amounts to the same thing: To every 0·1 Gm. of "606" 0·072 c.c. of 20 per cent. NaOH is added (e.g. 0·432 c.c. to a dose of 0·6 Gm.). The powder is rubbed to a paste with the alkali in a mortar. One to 2 c.c. of water are added, and the mixture again triturated; finally 5 c.c. of physiological salt solution is added to make the suspension for use. It is neutral, and contains correct amount of alkali to precipitate the base. The injection is made fairly deeply into the subcutaneous tissue, usually just below lower angle of the scapula.

McDonagh prepares his injection by rubbing the powder with 1 c.c. saturated NaOH solution, adding 3 to 4 c.c. *hot* water, then 3 drops phenolphthalein solution and enough glacial acetic acid to make a fine yellow emulsion. Finally a drop or two of the soda—i.e., sufficient to produce a pink colour.

Subcutaneous injections (according to Neisser) produce slow and protracted action. The injection is painful if excess of alkali be used. He suggests that combined treatment by intravenous injection (of 0·4 Gm.) and subcutaneous (0·5 Gm.) will probably prove useful. He, himself, has had good effect with *olive oil suspension of the hydrochloride.* These are decidedly non-irritating if freshly made each time, and are to be preferred to paraffin emulsions, as being more readily absorbed. The bulk of the injection should be kept down, i.e., an emulsion of not more than 6 c.c. may preferably be used.

Intramuscular or Subcutaneous Suspension (*Neutral*) *as advised by the Manufacturers.*—Place the contents of a "Salvarsan" tube (0·6 Gm.) in a small porcelain dish and rub it carefully with about 9 to 10 drops of sodium hydrate solution 15 per cent. by weight sp. gr. 1·17, then add, whilst continuing to rub with glass rod as at first, drop by drop the required amount of sterile water for making the injection—about 5 to 10 c.c. By this means one produces a fine suspension which is to be neutralized to litmus paper by the addition of either more sodium hydrate solution or of dilute hydrochloric acid of the P.G. strength. Obviously if less dose than 0·6 Gm. be desired, one uses proportionate amount of alkali:—

For a dose of 0·2 Gm. 3 to 4 drops of 15 per cent. sodium hydrate.

For a dose of 0·3 Gm. 4 to 5 drops of 15 per cent. sodium hydrate.

For a dose of 0·4 Gm. 6 to 7 drops of 15 per cent. sodium hydrate.

For a dose of 0·5 Gm. 8 drops, and so on in proportion—but it might be preferable to dissolve the full quantity in the tube and reject a proportionate volume.

Intravenous Injections.—The advantages of the intravenous method are that it is practically painless, and there are seldom objectionable local effects at point of injection. *Dose.*—As a rule less of the preparation is used than by the other methods, the average being 0·3 for women to 0·4 Gm. for men, diluted to about 200 to 300 c.c., repeated in three or four weeks. Larger doses than 0·5 Gm. are not advised. Intravenous injections must be suitably diluted. On two occasions out of three described (using a superficial vein in the elbow) all went well, but on the third (giving 0·4 Gm.) the dose was insufficiently diluted, i.e., it was injected in only 15 c.c. of water instead of 150 to 200 c.c. This killed the patient in $3\frac{1}{2}$ hours. Ehrlich defends the intravenous method. He says 300 intravenous injections in general cases have been made, and as much as 1 Gm. had been safely used intravenously.

"*Dilute Solution*" *Ehrlich* (*Intravenous*).—*Solution A.*—0·6 Gm. of the substance, 0·3 to 0·5 c.c. methyl alcohol, or 3 c.c. glycol.

Solution B.—240 c.c. or more physiological salt solution. 10·3 c.c. N/5 NaOH. Solution *A* is poured into *B* with thorough stirring.

Neisser in an early communication states that he employed the intravenous method whenever possible. In a much later communication he pointed out that intravenous injections of "606" (max. 0·5 Gm. in 200 c.c.) are energetic and rapid, but the action on spirochetes is correspondingly lessened.

Intravenous injections are, in a manner, more trustworthy, i.e., the dose given is known. Elimination is comparatively rapid—it may be complete about the fourth day.

Schreiber and Hoppe's Intravenous Injection.—Into a 200 c.c. graduated stoppered cylinder about 10 to 20 c.c. of water are placed, then the substance (0·3 to 0·5 Gm.) is shaken in and 0·3 c.c. or a few drops of methyl alcohol added to dissolve. To this about 1 c.c. N/1 NaOH to every 0·1 Gm., or q.s., is added to dissolve, and sterile physiological saline q.s. to 180 c.c., finally making up to 200 or 250 c.c. This is slightly alkaline.

Alt's Intravenous Injection.—By means of glass beads and a cylinder or separator, previously described (see page 274), one can produce a *suspension* rapidly. Place 8·5 c.c. of water in the cylinder, then the substance, and for every 0·1 Gm. of it about

0·3 c.c. of N/1 NaOH. Shake well for half a minute. Such a suspension is evenly distributed.

Salvarsan ("606") Dispensing Suspensions and Solutions of. W. H. Martindale. (*Chem. and Drugg.*, 1910, **77,** 897.) Injections of "606," dioxy-diaminoarsenobenzoldi-hydrochloride, $C_{12}H_6As_2(OH)_2(NH_2)_2(HCl)_2$, may be prepared as indicated by the following experiments. The contents of a tube (0·6 Gm.) were divided into two approximately equal portions, one weighing 0·288 Gm. and the other 0·3 Gm. It was proposed to prepare experimentally an intramuscular or subcutaneous injection, as it would be employed in practice, from the smaller portion. This amount was, therefore, placed in a little dish and rubbed with a pestle with the addition of 4 drops of 15 per cent. NaOH solution as directed. The mixture clogs somewhat, necessitating turning it over a few times with a clean spatula. Sterile distilled water was then added from a measure containing 5 c.c., drop by drop at first. The total 5 c.c. having been added, it was found that, firstly, 2 or 3 more drops of the NaOH solution were requisite to neutralize to litmus, as the mixture was still acid; secondly, that at least another 1 c.c. of water had to be added to render the mixture at all capable of removal by pouring from the dish to the previously sterilized hypodermic syringe, though it could be drawn up if the needle be wide enough in calibre. The suspension being thus prepared—i.e., after the two HCl radicals have been neutralized, forms a homogeneous cream, and is then ready for use. (*Note.*—Dilute hydrochloric acid of B.P. strength may be used to overcome any slight excess of alkali should it have been previously added by mistake.) The other portion of "606" (0·3 Gm.) was treated somewhat more scientifically, as "drops" are known to vary. It was placed in a small glass mortar and rubbed with 5 c.c. of water, in which quantity it is easily soluble (the exact solubility was not determined, but it certainly dissolved in 3 c.c.). N/10 NaOH was then added from a burette. A precipitate formed, which redissolved until 5·8 c.c. had been added. The mixture became gelatinous when 6·4 c.c. had been added, and looked somewhat like melted yellow petroleum-jelly, becoming thinner again on further addition of alkali (6·8 c.c., according to theory, are required to produce the *mono-hydrochloride*). Adding the alkali further, it was found that 12 c.c. approximately in all were requisite to neutralize to litmus-paper—i.e., the formation of the *base* (theory

demands 13·7 c.c.). Adding alkali further the precipitate visibly diminished, an almost clear solution being formed when 18 c.c. in all had been added (theory demands 20·5 c.c. for the formation of the *mono-sodium compound*—the third stage in the matter). The addition of a further quantity of alkali (up to 27·4 c.c.—the amount theoretically necessary for the *di-sodium compound*) did not render the solution absolutely clear, but filtration would effectually remove the slight opalescence.

For intravenous use, a more dilute solution has been advised by the makers—e.g., 0·5 Gm. is to be treated with 0·95 c.c. of 15 per cent. by weight of NaOH solution, the liquid being finally diluted to about 200 c.c. If this amount of alkali is transposed into terms of N/10 NaOH, it will be found to work out to about 40·9 c.c. (theory demands 34 c.c. approximately for the mono-sodium compound). The 40·9 c.c. is theoretically equivalent to a compound of equal molecular proportions of mono- and di-sodium bodies. Marked excess of alkali is to be avoided in all forms of the injection.

GALENICAL PHARMACY

Adrenine Solutions, Cause of Colouration of. W. Macadie. (*Pharm. J.*, 1910, **31**, 660.) The chief factor in the formation of colour in solutions of adrenine is free ammonia, either atmospheric, or in the water, or developed in the solution by micro-organisms. Oxidation produces a red colour, but not the brown tint characteristic of many deteriorated solutions of adrenine. Numerous experiments, which are detailed, lead to the following conclusions :—

Direct oxidation of adrenine hydrochloride produces after some time a pure red colour without any trace of the characteristic brown of discoloured solutions.

Oxidation of the free base, adrenine, produces a colourless solution.

Oxidation of adrenine hydrochloride in presence of a trace of alkali, i.e., oxidation of the free base, produces a colourless solution.

Action of a trace of alkali on the base, atmospheric oxygen being obviously negligible, produces immediate decomposition of the base, with production of a brownish-red solution, ultimately becoming dirty brown.

Adrenine hydrochloride is not a powerful reducing agent, although the free base is.

If atmospheric oxidation be the cause of colouration as met with in preparing the solution, acidity will not prevent it, for active oxidation of the salt (acid solution) produces in time a coloured solution, whereas active oxidation of the base (solution containing a minimal quantity or deficiency of acid) produces a colourless solution. According if the oxygen theory were true, an acid solution should be most coloured, whereas the reverse is the case. From this it is evident that the bulk of the colouration as commonly met with must be derived from free ammonia and not from atmospheric oxidation. The same action of free ammonia is seen in other phenolic-hydroxyl compounds, e.g., the salicylates.

Excess of acid as a preservative acts simply by absorbing the free atmospheric ammonia. It has no other action, except perhaps it makes the salt a little more stable.

Chloroform is simply an antiseptic. It checks the growth of ammoniacal organisms.

Chlor-butyl-alcohol is not a better antiseptic than chloroform.

Sulphurous acid and formaldehyde have been suggested as preservatives. These act simply by combining with free ammonia, forming respectively ammonium sulphite and hexamethylene-tetramine. At the same time they act as antiseptics.

Apparatus for Treatment of Fresh Plants with Boiling Alcohol. (E. Bourquelot and H. Hérissey. (*J. Pharm. Chim.*, 1911, **3**, 145.) This apparatus, which is figured, consists of a vessel for boiling alcohol, attached to a reflux condenser. On the top a cylindrical chamber fitted with a reversible diaphragm is fixed. The fresh herb is placed in this : an accurately fitting cover is clamped on ; the diaphragm is turned over and the material falls into the boiling alcohol. On replacing the diaphragm, which fits accurately, the cover may be removed and a fresh quantity of herb introduced into the chamber and thence let fall into the alcohol. This is continued until the alcohol bath is filled with material.

Assay Processes of the U.S.P. (*Proc. Amer. Pharm. Assoc.*, 1910, **58**, W. L. Scoville ; 818, A. B. Lyons ; 824, A. R. L. Dohme and H. Engelhardt, 829). Practical comments, criticisms and suggestions, mostly on the alkaloidal assay

processes, are given. The last named authors reproduce at length the processes for the assay of opium, nux vomica, and cinchona from eleven other pharmacopœias.

Belladonna and Hyoscyamus Extracts, Determination of Total Alkaloids in. (*Pharm. J. Russ.*, 1911, 138; *J. Pharm. Chim.*, 1911, **3**, 551.) After reviewing the official and other published methods for the alkaloidal assay of these extracts, the following process, which is claimed to give better results than any of these, is given. Three Gm. of belladonna extract, or 6 Gm. of hyoscyamus extract, is weighed into a stoppered flask. Five or 8 Gm. of water, 90 Gm. of Et_2O, and 1 Gm. of ammonia, are then added, and the whole is shaken up for 15 minutes. After separation 60 Gm. of the clear Et_2O layer is filtered off, and the solvent evaporated. The residue is then treated with 5 Gm. of Et_2O and again evaporated to dryness. This is repeated thrice more, each time with 5 Gm. of Et_2O. The residue is then dissolved in 5 Gm. of EtOH, 70 per cent., and the solution transferred to a graduated 100 c.c. flask. The first flask is washed out with another 5 c.c. of EtOH, 70 per cent., and then with water. To the bulked solutions and washings, 20 Gm. of NaCl, and 20 c.c. of N/100 HCl are added, with sufficient water to bring the total volume up to 100 c.c. After thorough agitation, the solution is filtered; 50 c.c. of the filtrate is transferred to a stoppered flask. Thirty c.c. of Et_2O and 5 drops of iodeosin indicator are added; the excess of HCl is then titrated with N/100 KOH in the usual manner. In the meantime, a blank experiment, with all the same reagents as above, but without any extracts, is performed, to obtain the correcting factor, which is deducted from the results of the above titration. Each 1 c.c. of N/100 HCl used up = 0·00289 Gm. of alkaloids. By multiplying the number of c.c. thus found by this figure, the result is the amount of alkaloids in 1 Gm. of extract of belladonna, or in 2 Gm. of extract of hyoscyamus. It is found that the blank experiment generally uses up from 2·3 to 2·4 c.c. of N/100 HCl, so that the correction is a very necessary one.

Belladonna and Scopola Extracts, Differentiation of, by Microscopical Examination. E. N. Gathercoal. (*Proc. Amer. Pharm. Assoc.*, 1910, **58**, 898.) It is shown that these extracts may be distinguished, and an admixture of scopola root extract with belladonna root extract may be detected, by the microsco-

pical examination of the structure of the vegetable tissue present.

One Gm. of the extract is well mixed in a test-tube with 25 c.c. of 50 per cent. alcohol, rubbing and stirring the extract into the fluid with a glass rod. The mixture is allowed to stand several hours until the precipitate settles out, or it may be centrifuged at once. The clear, supernatant liquid is poured off as completely as possible and a mount prepared from the precipitate. This may show starch, oil and cellular tissues, but so much brown extractive is present as to largely obscure other material.

To the remainder of the precipitate is added about 5 c.c. of strong HCl, which dissolves the starch and the brown extractive, but does not injure the vegetable tissues. Then about 10 c.c. of alcohol is added, the precipitate allowed to subside and the fluid decanted, or it is centrifugated. The precipitate is transferred to a slide and mounted in the few drops of fluid adhering to it.

The tracheal tissues were used as the principal means of distinguishing between scopola and belladonna roots. Some of the tracheal tubes of belladonna have, on their walls, well-defined, slightly elongated, bordered pits, and none of the tubes of scopola have such markings. Some of the tubes of scopola have on their walls much elongated, very prominent slits with the portions of the walls between the slits heavily thickened, giving very characteristic reticulate appearance. None of the belladonna tubes have such markings. However, some of the belladonna tubes have pores not bordered, and more elongated, so as to present a rather finely reticulate appearance, and also, some of the scopola tubes have the slits on the walls rather shorter and approach in appearance the tubes of belladonna just mentioned.

Bismuth and Ammonium Citrate Solution. R. C. Cowley. (*Australas. Pharm. Conf.*; *Pharm. J.*, 1911 [4], **32**, 131.) In the course of the preparation of this solution by the author and Catford's formula (*Y.B.*, **1900**, 202), it was noticed that bismuth citrate acts as a monobasic acid, so that it may be titrated with ammonia and litmus indicator. The neutral solution thus formed is useful for dispensing, since it does not precipitate with $NaHCO_3$ like the commercial Liquor Bismuthi. It is suggested that this method of neutralization should be employed to produce neutral bismuth solutions.

Calcium Sulphide Pills and Tablets, Stability of. M. R. Schmidt and H. Engelhardt. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1005.) The examination of 70 commercial samples of calcium sulphide preparations, including sugar coated and chocolated covered tablets, tablet triturates, and gelatin coated pills, showed that the whole were satisfactory and contained the full amount of active ingredient unimpaired. Twenty c.c. of N/10 iodine solution was run into a stoppered flask for every 1 grain CaS supposed to be present; the material was added and the mixture made strongly acid with HCl. After standing, well stoppered, with frequent shaking until decomposition was complete, the excess of iodine was titrated back. Each c.c. of N/10 I used up = 0·0036 Gm. of CaS. The U.S.P. drug being required to contain 55 : 100 of CaS, the figure found was divided by 0·55. Although some of the samples examined were three years old, no noticeable deterioration was found to have occurred.

Cantharides Tincture. W. L. Scoville. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1115.) Since alcohol is not a good solvent of combined cantharidin, it is proposed to employ an acid menstruum of 1 volume of glacial acetic acid and 15 volumes of alcohol for the preparation of the tincture. Tinctures prepared thus contain nearly twice as much cantharidin as those made with alcohol alone.

Cherry Laurel Water, Composition, Adulteration and Incompatibility of. F. de Myttenaere. (*Bull. Acad. royal de Belge*; *J. Pharm. Chim.*, 1910, **2,** 217.) Some pharmacopœias only require the determination of the total HCN; but the German, Swiss and Dutch pharmacopœias limit the amount of free acid. In the first two, 10 c.c. of the water are treated with 0·8 c.c. of N/10 $AgNO_3$ solution, a few drops of HNO_3 are added, and the mixture is filtered. The filtrate should show no further precipitate with more $AgNO_3$; thus limiting the amount of free HCN to 0·216 per 1000. A similar test in the Dutch pharmacopœia but using 6·2 N/100 $AgNO_3$, limits this amount to 0·1674 in 1,000. If the water contains nearly all its HCN in the free state when first distilled, the greater part soon combines with the benzaldehyde. In the official water, the amount of free HCN should be about $\frac{1}{5}$ the total HCN present. The free acid may be determined by Volhard's method. The following test serves to distinguish a natural water from a fictitious one

made with HCN and benzaldehyde. One drop of a solution of Congo red in dilute alcohol is added to 5 c.c. of the water. If natural, it remains a bright red colour without any blue shade. If it contain added benzaldehyde a blue or violet tint is evident. The incompatibility of the water with alkaloidal salts, especially with morphine hydrochloride, is attributed to minute traces of Cu ; light favours the formation of the precipitate, the nature of which is not known.

Cherry Laurel Water, Further Notes on. H. Rebaut. (*Bull. Sci. Pharm.*, 1910, **17,** 583.) Ten specimens of cherry laurel water have been kept under observation for some time. The author does not agree with Léger, that the stronger water is less prone to decomposition than the weaker. After the first month, it is found that the loss is not very great, for the next six months, and that cherry laurel water stored in well corked filled bottles would be fit for use after six months' keeping. The samples observed fell into two categories. In six cases, the loss of HCN during the first month was practically the same as the mean loss for the six succeeding months. In three others, the loss during the first month was ten times greater than that observed subsequently. The causes of these variations are not apparent. The varying alkalinity of the glass may not be without influence.

Cinchona, Fluid Extract of, U.S.P., Nature of Deposit from. — Javillier and B. Guerilhault. (*Bull. Sci. Pharm.*, 1911, **18,** 93.) The crystalline deposit which forms in this preparation is calcium quinate, and is quite free from alkaloids.

Easton's Syrup. G. Pégurier (*Bulletin du Syndicat des Pharmaciens des Alpes-Maritimes*; *Chem. and Drugg.*, 1910, **77,** 321) gives the following as an improved formula which keeps well : Iron powder, 8·6 Gm. ; concentrated phosphoric acid (sp. gr. 1·5), 62·5 Gm. ; strychnine, powdered, 0·57 Gm. ; quinine sulphate, 14·8 Gm. ; citric acid, powder, 15·0 Gm. ; simple syrup, 700 c.c. ; distilled water, q.s. to 1,000 c.c.

Dilute the H_3PO_4 with its own weight of water, place in a capsule and add the iron. Warm gently, carefully stirring the while. Add the alkaloids, and when they are dissolved filter into the syrup, to which add finally the citric acid and enough water to make a litre.

The syrup should be placed in yellow bottles of a capacity of from 90 to 125 c.c., entirely filled and sealed over with paraffin wax; the syrup thus protected keeps unchanged for a year.

Ergot and its Fluid Extract, Keeping Properties of. H. C. Wood, junr. (*Amer. J. Pharm.*, 1911, **83**, 172.) In view of the rapid deterioration of fluid extract of ergot, it is recommended that it should be filled into packages not exceeding 4 fl. oz. capacity immediately after the completion of percolation. Each such bottle should carry on the label the date of manufacture. No pharmacist should dispense liquid extract of ergot which is more than six months old.

The rate of loss of sphacelotoxin determined by the author's method (*Y.B.*, **1909**, 33) is thus recorded in different samples of liquid extract kept under varying conditions.

	5–15 weeks.	16–25 weeks.
Open bottles	6·4% loss per week.	2·5% loss per week.
Corked „	2·6% „ „ „	1·5% „ „ „
Sealed „	1·6% „ „ „	1·3% „ „ „

Ergot, Liquid Extract of, Methods of Preparation. E. Quant. (*Pharm. J.*, 1911 [4], **32**, 331.) The interpretation of the word "digest" in the pharmacopœia appears to vary. Cold water maceration seems to be largely resorted to. Since no temperature has been specified for the process of digestion, the author has taken this to mean 80–100°F. Extracting portions of the same ergot at this temperature, also with cold water, the liquid extract obtained by the warm process had the sp. gr. 1·038 and yield 15·1 per cent. of dry extractive. The product of the cold maceration had the sp. gr. 1·011 and gave 11·2 per cent. of extractive. In view of the known variability of ergot, and of the fluid extract, it is desirable that the method of preparation of the latter should be more precisely detailed.

Extracts, Green, Variation in Strength of. (*Southall's Report*, 1911, **19**, 31.) The green extracts of the Pharmacopœia have again (during the season of 1910) furnished evidence of their unreliability and variation in strength, that of belladonna being nearly 50 per cent. less active than the extract of season 1907. These preparations should either be standardized or else deleted from the B.P.

Belladonna, Green Extract.—The extract prepared in the past season from several tons of herb, bulked and assayed,

yielded but 0·80 per cent. of total alkaloids by titration, one of the lowest figures as yet recorded, although not so low as that given by a sample obtained last year of unquestionable purity, which contained but 0·73 per cent. Comparing the figures obtained during the last nine years, it will readily be seen how great is the variation in the alkaloidal strength of this preparation. They are: 1·38, 1·50, 1·08, 0·87, 1·04, 1·25, 1·57, 0·98, 0·80 per cent., respectively.

Conium, Extract.—A sample from a batch manufactured last summer yielded 0·40 per cent. of total alkaloids as hydrochlorides, this being about an average result. A second sample, from another source, proved to contain 0·27 per cent.

Hyoscyamus, Green Extract.—Total alkaloid by titration yielded by a bulk sample of 1910 season's manufacture was 0·084 per cent., this being, as in the case of extract of belladonna, a very low figure and possibly to be attributed to the wet season.

Extracts of Animal Organs. E. Choay. (*J. Pharm. Chim.*, 1911, **3**, 233, 287.) From a series of experiments on liver pulp it appears that only extracts of organs which are prepared in the cold, and dried *in vacuo*, retain unimpaired their original oxidizing power. Pulp preserved at 42°C. shows a marked autolytic change. An extract prepared in the air at 50°C. under the best manufacturing conditions compares very unfavourably with a similar extract from the same material, at 50°C., prepared *in vacuo*. The method of drying animal organs in the air at 40°C. cannot possibly produce fully active extracts. The ferments of the pancreas, and the hepatic diastases, are profoundly affected by this procedure. In order to test the activity of dry liver tissue or other organ preparation, 0·25 Gm. may be macerated for 15 minutes in 80 c.c. of water; to this then 20 c.c. of H_2O_2 is added. There should be an immediate and abundant evolution of oxygen.

Fern Rhizomes, Anthelmintic, Yield of Extract and Relative Activity of. H. V. Rosendahl. (*Apoth. Zeit.*, 1911, **26**, 588; *Svensk. farmac. Tidskrift.*, 1911, 85.) The rhizome of *Aspidium filix mas* collected at the end of May gives 10 per cent. of ether extract; in August it yields 12·5 per cent.; in October, 11 per cent. *Dryopteris spinulosa* rhizome gives 17 per cent. of extract in August. *D. dilatata*, in May, 10 per cent. *Pteris aquilina*, in May, 2 per cent. *Athyrium filix femina*, in May,

0·9 per cent., and *Aspidium alpestris*, in August, only 0·7 per cent. *Dryopteris dilatata* extract is found to be at least four times more active against *Bothrycephalus latus* than the universally official extract of male fern. Two Gm. of this extract, is therapeutically equivalent to 8 or 10 Gm. of male fern extract and to 4 Gm. of *Dryopteris spinulosa* extract. It is therefore suggested that the extract of *Dryopteris dilatata*, the broad buckler fern, should receive official recognition instead of extract of male fern. It is stated that the microscopical appearance of these extracts is sufficiently distinctive to allow them to be identified by that means. [*Dryopteris dilatata*, the broad buckler fern, is now named *Lastrea aristata*, Rendle and Britten (*dilatata* Presl.) in the London Catalogue **1908.**—Ed. *Y.B.*]

Fluid Extracts and Repercolation. H. V. Arny and F. H. Oxley. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1104.) The authors conclude that neither by percolation and evaporation of the weaker percolate, nor by re-percolation, can the majority of fluid extracts be made to represent by volume the same weight of drug. They suggest percolating to one-half the volume (500 c.c. from 1,000 Gm. of drug) and then diluting this strong percolate so that each c.c. of finished product shall contain the equivalent of 1 Gm. of drug.

Fluid Extracts, Comments on, by the U.S.P. Committee of the Amer. Pharm. Assoc. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 781.) The following are some individual opinions of members of the committee. The therapeutic importance of fluid extracts has been somewhat exaggerated, and the more easily prepared tinctures will probably answer all requirements. A process based on incomplete exhaustion might be sometimes preferable. The use of glycerin and of acetic acid should be further investigated to see if it is really desirable. Repercolation, if used, should be more definitely defined. The desirability of the use of sodium hydroxide in *Fluid extractum Taraxaci* is questioned. The instability of fluid extracts is largely due to the extractive in the final exhaustion, and the changes it undergoes during evaporation. In some cases it may be preferable to slowly percolate up to 850 c.c. (from 1,000 Gm. of drug) and take this as the finished product. Certain fluid extracts are enumerated as falling into disuse, and among these is that of coca. In the case of cinchona, the addition of a small amount of

HCl is advocated to ensure better extraction of alkaloids. Acetic acid, in fluid extract of nux vomica, dissolves a great deal of undesirable gelatinous extractive. In red rose, a little H_2SO_4 should be added to the menstruum.

Galenicals, Alkaloidal, Stability of. A. R. L. Dohme and H. Engelhardt (*Proc. Amer. Pharm. Assoc.*, 1910, **58**, 872); W. L. Scoville (*ibid.*, 874). Dohme and Engelhardt find, as the result of periodical assay of the chief alkaloidal fluid extracts, that all these preparations are fairly constant for periods of three years or less, with the exception of fluid extract of coca, and of calabar bean. The former showed a loss of 20 per cent. of its cocaine in a period of over 2 years.

Scoville has periodically examined sixty preparations, fluid extracts and tinctures, the majority of which are between one and two years old.

Each (except the solid extracts) has been opened at least five times within the past year, and a portion taken out. Old preparations of the mydriatic drugs are much more difficult to assay than fresh preparations, particularly the leaf preparations, and require the use of alcohol during the process of extracting the alkaloids. Coca and sanguinaria preparations show a rapid deterioration, and a change in composition. The cinchona preparations deteriorated, accompanied by, and apparently caused by, a marked precipitation. A corresponding preparation which has remained clear and been less exposed, shows no deterioration.

Pilocarpus fluid extract shows a slight deterioration, and also a marked precipitation. Colchicum and conium show vagaries in assay results which forbid positive conclusions, but at least a fair degree of permanence is indicated. Gelsemium and hydrastis shows a possible slight loss in strength, but not sufficient to be of serious import. The other preparations all show a stability under varying conditions of exposure, etc., which is entirely satisfactory.

Galenicals, Desirability of the Preparation of, by the Retail Pharmacist. W. Dulière. (*Internat. Pharm. Congress, Brussels*; *Pharm. J.*, 1910 [4], **31**, 368.) The author spoke from practical experience of 30 years, as well as from knowledge obtained in the course of his duties as inspector. Apart from preparations which owe their activity to well-defined principles, capable of being determined, those preparations which are

obtained from plants or from products of vegetable origin have a composition which has not been properly established, and are difficult and sometimes impossible of estimation. Certain pharmacopœias define for these latter characters to which they should respond, but it is not practicable to distinguish by these means genuine from sophisticated products. In the case of preparations containing alkaloids their estimation does not always give a true indication of their value, any more than does the determination of the predominant ingredient of an essential oil give an idea of its flavour.

Vegetable Powders.—All pharmacopœias order that these powders should only be made from drugs of good quality, complying with certain prescribed characters. Powders are the form in which drugs of poor quality are put on the market. One also meets with powders which have been denuded of their active principles, and the fraud is masked by mixing with them powder of good quality or by adding to them a few drops of essential oil. The powders of commerce often give an ash yield which is too high, either because the drugs from which they are made have been badly dried, or because mineral substances have been added to them. Pharmacists cannot be too strongly recommended to prepare their own powders.

Tinctures.—The details given in different pharmacopœias concerning the characters of each tincture vary considerably in different countries, and with the exception of tinctures which can be standardized to alkaloidal content, these details are not sufficient to ensure that a preparation that has been bought is composed exactly according to the formula. Certain pharmacopœias, notably the last editions of the French Pharmacopœia and the German Pharmacopœia, are absolutely silent as to the content in extractives and the sp. gr. of properly made tinctures. In Belgium and in Austria the pharmacopœias fix a minimum quantity of extractive. In Switzerland the pharmacopœia is satisfied with indicating what should be the alcoholic strength of each tincture. The Dutch pharmacopœia states the minimum quantity of extractive and indicates at the same time the sp. gr. limits. The extract content is, however, an important consideration, and further it is necessary to know the nature of this extract, but if the drug from which the tincture is made is damaged or old the extract content will give but slight indication of inferiority. As to the sp. gr., it has often been found (on the Continent) that tinctures of normal sp. gr. are made with methyl

alcohol to which water has been added in sufficient quantity to mask the fraud.

Extracts.—This form of preparation is one which lends itself better than any other to the utilization of unsaleable drugs. The complex composition—common elements are found in all vegetable bodies—renders their estimation and identification extremely difficult, and hard y permits the pharmacist to recognize mixtures submitted to him. If it is easy to distinguish an aqueous extract from an alcoholic extract and an ether extract from an aqueous or alcoholic extract, the characters which differentiate extracts prepared from the same menstruum are often ill-defined with the exception of alkaloidal extracts, and the descriptions which pharmacopœias give are absolutely banal and superficial.

Ointments.—Resinous ointments have a composition which is generally too complex and subject to too great a variation to allow of any definite conclusions being drawn from an analysis. Only the substitution of mineral wax for beeswax can be recognized for a certainty. The necessity of the pharmacist preparing his own resinous ointments is too evident to be insisted on. It should be added that the ease with which the other ointments may be prepared cannot excuse the pharmacist from making them himself.

In the discussion which followed, Hérissey questioned whether it was not often more profitable for the pharmacist to buy his preparations ready made, and pointed out that in pharmacies where the staff was very limited in number a pharmacist who made his own preparations was often put to considerable inconvenience. Lepage contended that in the case of preparations which could only be assayed by physiological means it was hardly possible for pharmacists to be their own manufacturers, and to be quite sure that the ultimate product was as it should be. E. White expressed agreement with Dulière's observations as to the desirability of pharmacists making their own preparations. He much regretted that the practice among pharmacists of making their own tinctures and the like was declining, for this was part of the pharmacist's duty. Unfortunately many potent preparations were difficult of manufacture by pharmacists economically, but, on the other hand, there were many preparations which presented no such difficulty. It was noticeable that pharmacists who manufacture their own preparations were generally the pharmacists of best repute. Peck considered

that pharmacists who made their own galenical preparations gained confidence in themselves and were able to obtain the confidence of medical practitioners. As regards pharmacists who had apprentices, it was clearly their duty to make thei own preparations, otherwise they could not properly teach their pupils the art of pharmacy.

Galenical Preparations, Suggested Standards for. (*Southall's Report*, 1911, **19**, 33-39.) The suggested limits for sp. gr. for percentage *w/v* of active principle, or extractive; and in alcoholic preparations for the percentage by volume of alcohol, are presented in tabular form. This is most useful for reference.

Gauzes, Medicated, Extemporaneous Preparation of. G. M. Beringer, jun. (*Amer. J. Pharm.*, **83**, 178.) Suitable material for the preparation of medicated gauze can now be had, already prepared, in the market. A satisfactory product contains about twelve threads to the centimetre, both on the woof and on the warp, and is conveniently used in widths of about 90 Cms. (1 yd.). One metre of this weighs about 25 Gm. It should be free from chlorine and starch or dressing. According to the B.P.C. 1 Gm., when incinerated, should yield "practically no residue."

The tables, floor, and all other possible portions of the room where gauzes are to be prepared should be scrubbed with hot lye solution containing phenol. The top of the work-table should be preferably of glass, but, if not, should be thoroughly scrubbed and finally washed with a 1 : 500 "bichloride solution," and covered with sheets of sterilized parchment paper before any dressings are placed upon it. The hands and nails of the operator should be scrupulously clean, and washed, just before handling the material, in a 5 per cent. phenol solution. The clothing and hair should be covered with garments or wrappings of sterile muslin or gauze. Also, any objects not capable of being moved from the neighbourhood of the work, and not needed for it, should be covered with sterile cloths. Jars, rods, and all other materials should be sterilized, where possible, by boiling in water for 15 minutes. Cartons and paper for packing and wrapping should be heated in an oven for one half hour at a temperature of 120–150°C.

The gauzes on the market, both plain and medicated, are in two forms—moist and dry. Hence directions for both are given,

The moist forms seem to have the preference of most surgeons. They are more readily sterilized in that condition, are more pliable and suitable for packing wounds and cavities, ensure more rapid drainage, and have less tendency to adhere to the wound surfaces.

Plain Absorbent Gauze, Dry.—The gauze should be cut into convenient lengths and rolled or folded into suitable bundles, wrapped in sterilized parchment paper and placed in a steam-bath for one half-hour. It should then be removed and placed in previously sterilized cartons or wrapped in sterilized tough heavy paper.

Plain Absorbent Gauze, Moist.—The gauze should be cut into suitable lengths, then sprinkled with sterilized distilled water, containing 5 per cent. of glycerin, and packed in previously sterilized amber glass jars. The filled jars, with the caps loosely placed, should then be re-sterilized in a steam-bath for one half-hour, after which they should be immediately sealed.

Iodoform Gauze, 10 per cent., Dry.—Iodoform, 10 Gm.; acetone, 100 c.c.; sterile gauze, 100 Gm. Dissolve the iodoform in the acetone and pour over the gauze loosely placed in a sterilized jar, or other suitable container, fitted with a close cover. Cover and allow to stand about 15 minutes or until evenly moistened. Remove from the jar and drive off the acetone by waving in the air. Immediately wrap in sterilized parchment paper. Re-sterilize in steam-bath for 15 minutes, and then enclose in a tight carton, or tough paper wrapper, previously sterilized.

Iodoform Gauze, 10 per cent., Moist.—Prepare by taking iodoform gauze, dry, as above, and sprinkling with freshly sterilized distilled water containing 5 per cent. of glycerin (about 75 c.c. will be needed for each 100 Gm. of gauze). Allow to stand in a covered sterile jar till the moisture is evenly distributed. Pack into sterilized amber glass jars and re-sterilize in a steam-bath for 15 minutes, with lids of jars loosely placed. Hermetically seal the jars immediately upon removal from the sterilizer. Re-sterilization for only 15 minutes is directed for iodoform gauze because of the ease with which iodoform is decomposed by heat. Prepared in this manner, the iodoform is so firmly attached to the gauze that very little is washed off when immersed in water.

Thymol Iodide Gauze, 5 per cent., Dry.—Thymol iodide, 5 Gm.; chloroform, 25 c.c.; acetone, 50 c.c.; sterile gauze, 100 Gm. Dissolve the thymol iodide in the chloroform and add the acetone. Prepare as directed for iodoform gauze, dry. $CHCl_3$ is the best

single solvent for thymol iodide, although no one solvent dissolves it entirely. Acetone is, however, the cheaper and, in the combination above, works satisfactorily.

Thymol Iodide Gauze, 5 per cent., Moist.—Dry thymol iodide gauze, 100 Gm.; water, 75 c.c.; glycerin, 5 Gm. Prepare as directed for iodoform gauze, moist.

Sublimated or Bichloride Gauze (Dry), 1 : 1,000.—Mercuric chloride, 0·1 Gm.; water, 37·5 c.c.; acetone, 37·5 c.c.; sterile gauze, 100·0 Gm. Dissolve the $HgCl_2$ in the acetone and water and proceed as under iodoform gauze, dry, but re-sterilize for one half-hour.

Sublimated or Bichloride Gauze (Moist), 1 : 1,000.—Mercuric chloride, 0·1 Gm.; water, 75·0 c.c.; glycerin, 5·0 c.c.; sterile gauze, 100·0 Gm. Dissolve the $HgCl_2$ in the water and add the glycerin. Proceed as directed for iodoform gauze, dry, but pack in sterilized amber glass jars. Have jar lids loosely placed, then put jars into steam-bath and re-sterilize for one half-hour. Hermetically seal immediately upon removal from the sterilizer.

Phenolated or Carbolized Gauze, 5 per cent., Dry.—Phenol, crystals, 5 Gm.; acetone, 50 c.c.; water, 50 c.c.; sterile gauze, 100 Gm. Mix the acetone and the water, add the phenol, and proceed as for iodoform gauze, dry. Re-sterilization is used for only 15 minutes in this case, because of the ease with which the phenol may be volatilized through the wrapping. While a small amount of moisture remains in the product when finished, it will dry rapidly after packing.

Phenolated or Carbolized Gauze, 5 per cent., Moist.—Phenol, crystals, 5 Gm.; acetone, 50 c.c.; water, 50 c.c.; glycerin, 5 Gm.; sterile gauze, 100 Gm. Mix the acetone, water and glycerin and dissolve the phenol in the mixture. Proceed as for iodoform gauze, dry, but pack, upon removal from the impregnating jar, into sterilized amber glass jars and re-sterilize in a steam-bath for one half-hour, having the lids of the jars loosely placed. Hermetically seal immediately upon removal from the sterilizer.

Borated Gauze, 10 per cent., Dry.—Boric acid, 10 Gm.; water, 100 c.c.; sterile gauze, 100 Gm. Dissolve the boric acid in the water by heat and proceed as for iodoform gauze, dry, excepting that the material should be kept at the temperature of boiling water till the moisture is evenly distributed, and then pack without further drying. Re-sterilize for one half-hour.

Borated Gauze, 10 per cent., Moist.—Boric acid, 10 Gm.; gly-

cerin, 5 Gm. ; water, 100 c.c. ; sterile gauze, 100 Gm. Dissolve the boric acid in the glycerin and water with the aid of heat. Proceed as for above, but pack in jars and finish as under iodoform gauze, moist, excepting that resterilization should be continued for one half-hour.

Picric Acid Gauze, 2 per cent., Dry.—Picric acid, 2 Gm. ; water, 50 c.c. ; acetone, 50 c.c. ; sterile gauze, 100 Gm. Dissolve the picric acid in the acetone and water, and proceed as under iodoform gauze, dry.

Picric Acid Gauze, 2 per cent., Moist.—Picric acid, 2 Gm. ; glycerin, 5 Gm. ; water, 50 c.c. ; acetone, 50 c.c. ; sterile gauze, 100 Gm. Dissolve the picric acid in the glycerin, water and acetone, and proceed as for phenolated gauze, moist.

All gauzes for medication should be sterilized just before being used. This should be preferably by dry heat at a temperature of 120–150°C. for one half-hour, as many of the moistening liquids cannot be satisfactorily applied to any but dry material.

Gentian, Tincture of, made with Cold Alcohol, unstable. M. Bridel. (*J. Pharm. Chim.*, 1911, **3,** 534.) Cold alcohol 60 per cent., as recommended for the preparation of tincture of gentian in the French Codex, by the maceration process, does not arrest the action of the emulsin contained in the root, consequently such tinctures gradually lose their gentiopicrin, even if originally prepared from dried, unfermented gentian root rich in that glucoside. If, however, the alcohol and the prescribed amount of gentian root are heated to boiling under a reflux condenser for 20 minutes before commencing the maceration process, it is easy to obtain a stable tincture containing 1 per cent. of gentiopicrin.

Hydrogen Peroxide Solution, Preservation of. M. Schlaugk. (*Apoth. Zeit.*, 1911, **26,** 106.) Para-acetyl-amidophenol is recommended as a preservative for H_2O_2 solutions for dental and cosmetic use. Its presence increases the antiseptic action of the solution.

Hyoscyamus Extract, Green and Liquid, Alkaloidal Value of. (*Evans' Analyt. Report*, 1910, 36.) Four samples examined contained 0·03, 0·07, 0·08, 0·11 per cent. of alkaloids. Two samples of liquid extract contained 0·03 to 0·05 per cent. of alkaloids.

Iodine Tincture of the French Codex. C. Courtot. (*J. Pharm. Chim.*, 1910, **2**, 344.) The tincture of the French Codex 1908 differing from that of 1884 only in containing more I, it is not surprising to find that it undergoes the same decompositions already noted by the author (*Y.B.*, **1910**, 259). By adding 35 Gm. of NaI or its equivalent of KI to each kilo of tincture, all decomposition is prevented. (The French Codex tincture is merely a solution of I in EtOH 95 per cent. without any KI or NaI.)

Iron and Ammonium Citrate, Iron and Quinine Citrate. R. C. Cowley. (*Pharm. J.*, 1911 [4], **32**, 131.) The official proportions for iron prescribed for making the *ammoniocitrate* scales is in excess of the theoretical requirements for the formula $(NH_4)_3 2FeC_6H_5O_7$. This formula is probably correct, for other alkalies substituted for the NH_4 in equivalent proportions give similar compounds. To obtain a scale which will conform with these proportions, the quantity of $Fe_2 3SO_4$ solution should be reduced from 200 to 150. The scales will be lighter in colour than the official product, but more soluble. A green scale preparation may be obtained by increasing the quantity of citric acid by one half. More acid still further brightens the colour, but when neutralized with ammonia such products are difficult to scale. In *iron and quinine citrate* the iron is wholly in the ferric form in a complex organic combination. In the preparation of *tartarated iron* the ferric hydroxide should be heated with the $KHC_4H_4O_6$ until it is dissolved, and the solution should then be neutralized with KOH. The scales produced will then be much more soluble.

Iron, Quinine and Strychnine Phosphates, Elixir. A. F. Marquier. (*Proc. Amer. Pharm. Assoc.*, 1910, **58**, 1200.) An improved formula for the preparation is as follows: Ferric phosphate soluble, 32·0 Gm.; quinine phosphate, 8·5 Gm.; strychnine phosphate, ·24 Gm.; oil sweet orange, 2·0 c.c.; alcohol, 250·0 c.c.; glycerin, 300·0 c.c.; water, a sufficient quantity to make 1,000·0 c.c. Dissolve the ferric phosphate in 300 c.c. of distilled water; by cold maceration, the strychnine and quinine phosphates and oil of orange in the alcohol; add to this the glycerin, and lastly the iron solution; allow to stand 24 hours, if possible, and filter. This preparation will mix with water in all proportions without precipitation and retains its green colour even though exposed to light. The

cost of ingredients is no more, if anything less, than the present official preparation.

Kola Extract. J. Warin and F. Grand. (*J. Pharm. Chim.*, 1910, **2,** 350.) Reverting to the fact that it is impossible to obtain an extract containing 10 per cent. of caffeine from kola powder with 1·25 per cent. (*Y.B.*, **1910,** 262), the authors now show that when the original powder greatly exceeds the official requirements in caffeine strength, the extract prepared from it will still be very much below the required standard, and may not contain even 5 per cent of caffeine. The original extraction liquid contains almost all, 95·75 per cent., of the total caffeine present. To absolutely exhaust the marc would require half as much more menstruum. The greatest loss of caffeine is occasioned (*loc. cit.*) by filtration. But even in extracts prepared without filtration, the caffeine found is lower than the theoretical yield, calculated on the assay of the drug. This is either due to loss during preparation, or to occlusion of part of the alkaloid in the resinous mass of the extract.

Lard, Elm Bark as a Preservative for. R. M. Altmann. (*Drugg. Circ.*, 1911, **55,** 128.) The addition of pieces of elm bark, *Ulmus flavus* (*fulva* ?) in the proportion of 2 drachms to each pound of fat, added during rendering on the water-bath in the course of making prepared lard, is stated to act as a clarifying and preservative agent. Lard thus prepared, and left exposed to the air for three weeks, was found to be free from rancidity when tested with Schiff's reagent. An ointment of KI prepared with the lard, without the addition of K_2CO_3, remained uncoloured after a week's exposure to the air.

Leaves, Action of Alcohol Vapour under Low Pressure on Enzymes of. L. Aurousseau. (*Bull. Sci. Pharmacol.*, 1910, **17,** 320.) Fresh leaves containing enzymes are exposed to alcohol vapour under a pressure of $\frac{1}{4}$ atmosphere for 2 minutes, the temperature rising to 82°C. Invertase, rennet-enzyme, myrosin, oxydases, emulsin, and tyrosinase are destroyed, but in order to destroy peroxydases a pressure of $\frac{1}{2}$ atmosphere is sometimes required. Leaves freed from enzymes in this way dry rapidly and yield galenical preparations of indefinite stability.

Mercury Oleate. R. C. Cowley. (*Chem. and Drugg.*, 1911, **78,** 20.) The author condemns the method of dissolving the

oxide in oleic acid and advocates the precipitation method, as follows: Mercury, 100 Gm.; nitric acid, 200 c.c.; dried hard soap, 300 Gm. Dissolve the Hg in the HNO_3, heat to oxidize the Hg to the mercuric condition; evaporate the solution until a film forms on the surface; add the soap dissolved in 1,000 c.c. of water, stirring well; separate the mercuric oleate and dry. The product keeps in a loosely covered pot with very little change in colour, and retains the Hg in the mercuric state. With the formula and mode of procedure of the B.P., reduction of the mercuric compound constantly occurs. Apart from this, the use of powdered hard soap is objectionable.

Nux Vomica, Liquid Extract of, Variability of Commercial. (*Evans' Analyt. Notes*, **1910**, 51.) The strychnine content of samples of liquid extract of nux vomica varies from 1·1 to 1·5 per cent. The alcoholic strength of the product also shows undue variation, ranging from 59·7 to 69·7 per cent. of alcohol. The following is an improvement of previously published methods for the assay of this extract.

Five c.c. liquid extract is very gently agitated with 15 c.c. of $CHCl_3$ in a separator, and a cold solution of 2 Gm. of dry Na_2CO_3 in 15 c.c. of water is added; agitation is carefully continued for 2 minutes. The $CHCl_3$ is then separated, using heat if necessary, and when clear is run off. Re-extract with 10, 10 c.c. of $CHCl_3$, bulk the $CHCl_3$ and shake out with 15 c.c. of 4 per cent. sulphuric acid, and then 10 and 10 c.c. of 2 per cent., add 15 c.c. of water. Should the temperature be abnormal either through cold weather or heating to effect separation, it is very important for quantitative and selective destruction of the brucine to stand the separator in a bath at 20°C.; then add directly to the separator 5 c.c. of fully concentrated nitric acid (sp. gr. 1·42). Stand 15 minutes; then add 30 c.c. of 20 per cent. sodium hydroxide. Extract with 15, 12, 10 c.c. of chloroform. Special care must be taken with the last separations, to avoid any of the alkaline portion being admixed. Evaporate to dryness at 80–90° in a weighed beaker, desiccate with 2 c.c. of absolute alcohol at same temperature, dry until constant at 100°. It is interesting that even at 80° there are indications of slight decomposition, a marked odour of pyridine being evident. Check the purity by titration. Add 10 c.c. of N/10 H_2SO_4; back titrate with N/20 NaOH, indicating with cochineal; (1 c.c. N/10 acid = 0·0334 Gm. of strychnine). In

the case of very fatty extracts it may be necessary to interpose one or two additional washings.

Ointments, Pharmacopœial. P. Boa. (*Pharm. J.*, 1911 [4], **32**, 407.) *Unguentum acidi salicylici.*—The official ointment, although suitable for application to a wide surface, is not of a good consistence for use on a limited area. Hydrous wool-fat appears to fulfil the requirement of a basis that adheres well and spreads little beyond the localized surface to which it is applied. It is suggested as an alternative basis. The salicylic acid should be directed to be very finely powdered.

Unguentum creosoti and Unguentum eucalypti.—The official paraffin ointment is recommended as the basis, and the eucalyptus oil or creosote should be incorporated with the cold basis.

Unguentum glycerini plumbi subacetatis.—The official synonym of "Lead sub-acetate ointment" for this is criticized.

Unguentum hydrargyri nitratis dilutum.—This and Ung. hyd. nit. are only suited for veterinary practice.

Unguentum hydrargyri oxidi flavi.—This has come largely into use and seems to meet with the approval of prescribers. The author does not advocate the use of moist freshly precipitated HgO.

Unguentum hydrargyri oxidi rubri.—The red mercuric oxide is directed to be "in very fine powder." When reduced to this condition it is no longer red. The official description is, therefore, somewhat of a misnomer. It is suggested that yellow mercuric oxide should be substituted for the red, the same strength and basis being retained and the name changed to Ung. hydrarg. flav. fort.

Unguentum plumbi acetatis is improved by triturating the lead acetate with twice its weight of water previous to incorporation with the basis, an equivalent weight of which may be omitted.

Oleates, Certain Metallic. G. J. Mackay. (*Australas. Pharm. Conf.*; *Pharm. J.*, 1911 [4], **32**, 269.) The inclusion of the oleinates in the B.P. Codex is considered to be unnecessary, since the oleates of the metals may be used. These may be prepared by the double decomposition of the metallic salts with potassium or sodium oleate. The precipitation should be performed with dilute solutions, and there should be a slight excess of the metallic salt present. The oleates are medicinally valuable on account of the ease with which they are absorbed by the

skin. Their value for internal administration appears to have been overlooked. Ferric oleate, for instance, is probably more readily assimilated than the albumin iron compounds. The oleates of uranium and of thorium are stated to possess radio-active properties, and may be applicable to the treatment of malignant growths. Silver oleate is specially recommended for therapeutic use, since it is not caustic and astringent like $AgNO_3$, and is well suited for internal administration and for ophthalmic application. Protected from light, it is stable and non-hygroscopic. It is useful as an antiseptic for wounds, and may be compounded in the form of ointments, bougies or pessaries. It is probably superior in bactericidal power to the proteid silver compounds. It is very readily absorbed. Ammonium oleate has many applications in pharmacy. It aids the emulsification of oils and fats, and renders them absorbable. It is a necessary constituent of the parogens. It is more stable than oleic acid, and when neutral, may be used to dissolve other oleates, for preparing solutions for intramuscular injection, and as a solvent for such drugs as iodine, menthol and camphor. It is an admirable emulsifying agent for cod liver oil.

Phosphorized Oil Emulsion. Kassowitz. (*Formular Nouveaux Remèdes*, 1910, **27** [14].) Phosphorus *one centigrammey*; dissolve in oil of sweet almonds, 10 Gm.; then add powdered gum acacia, 5 Gm.; simple syrup, 5 Gm.; distilled water, 80 Gm. A teaspoonful contains about half a milligramme of P. *Dose:* One to four teaspoonfuls a day.

Sterilization and Desiccation of Medicinal Plants. E. Bourquelot. (*J. Pharm. Chim.*, 1911, **3**, 149.) Reviewing the whole question as shown in the light of the researches with the biological method, it is considered that for the preparation of drugs, apart from exceptional cases, a rapid and thorough drying is sufficient to preserve the greater part of the active principles more or less intact. But it is otherwise when it is desired to know the condition in which the active principles exist in the living plant. In this case recourse must be had to sterilization with boiling alcohol. Not only does quick drying sufficiently preserve the drug, but it also greatly reduces its volume and therefore the bulk of material to be handled or taken for a dose. In the case of some tinctures or strong mother tinctures made from fresh and dried drugs, such as those of aconite,

colchicum, cloves, and cinchona, a slow but progressive change occurs when these are made with cold alcohol. If the alcohol and drug be heated to boiling for a short time under a reflux condenser all such changes will be avoided. It is a curious and interesting fact that the process of drying invariably causes an increase in the amount of cane sugar present in roots and other subterranean parts of plants. This increase varies from 12 per cent. in gentian to as much as 302 per cent. in aconite. It is possible that this process resembles the ripening of fruits. In the case of leaves, however, the reverse occurs. With these a marked diminution of the amount of sugar present generally occurs on drying.

Syrupus Scillæ. Walter S. Clark. (*Chem. and Drugg.*, 1910, **77,** 168.) In the preparation of syrupus scillæ one might expect the following changes to occur: (1) Loss of acid, (2) inversion of sugar, and (3) hydrolysis of the glucosides present. The following experiments show that these expectations are fulfilled in part: Two experimental batches of syrup were prepared, (*a*) Containing 95 grams of sugar and 50 c.c. of acetum scillæ, the whole being finally made up to 145 grams (=108·7 c.c.). (*b*) Containing 95 grams of sugar and 50 c.c. of dilute acetic acid, the whole being finally made up to 145 grams. (*c*) At the same time, 50 c.c. of the acetum used in (*a*) was heated under the same conditions of time, temperature, extent of exposed surface, etc. These batches were then examined as follows:—

	A.	B.	C.	D.
Sp. gr. at 15·5° C.	1·3342	1·3267	1·0395	1·0385
Grams of acetic acid per 100 c.c. .	1·569	1·969	3·36	3·63
Grams of acid originally taken. .	1·67	2·09	3·63	—
Rotation before inversion (200 mm.)	+96·0°	+66·0°	−5·2°	−5·2°
Rotation after inversion (200 mm.)	−44·0°	−38·4°	—	+12·6°

Column D gives the results obtained with the original acetum. The figures are calculated from the results obtained with suitably diluted solutions, and the rotations were taken at 17°C.

These results show that during the preparation of the syrup—

1. A loss of about 6 per cent. of acid occurs. The extent of this loss would differ under different conditions.

2. A considerable amount of inversion of the sugar takes place. Thus in the case of the sample (*B*), if no change had taken

place during its treatment, the reading before inversion should be +115·6°, and after inversion — 38·5°.

3. Judged by the rotation, practically no decomposition of the glucosides takes place.

Four samples of syrup, obtained from different wholesale houses, gave the following results. (The results from sample A are inserted for comparison):

	A.	E.	F.	G.	H.
Sp. gr.	1·3342	1·3426	1·3355	1·3341	1·3211
Grams of acetic acid per 100 c.c.	1·569	1·842	1·532	1·641	1·453
Original rotation	+96·0°	+77·8°	+104·0°	+64·0°	+102·0°
Rotation after inversion	−44·0°	−43·2°	−44·0°	−40·0°	−41·6°

Three samples of acetum scillæ gave the following results:

	M.	N.	O.
Acetic acid, grams per 100 c.c.	3·32	3·94	3·89
Sp. gr.	1·025	1·031	1·041
Rotation before hydrolysis	−3·9°	−4·6°	−5·8°
Rotation after hydrolysis	−8·0°	−9·2°	−13·2°

Having regard to the potency of squill preparations, this variability in commercial products calls for some method of standardization.

Syrup. Ferri Iodidi. J. K. Thum. (*Amer. Drugg.*, 1910, **57,** 130.) The addition of reducing or preservative agents, such as hypophosphorus acid, is quite unnecessary and is objectionable in the preparation of syrup of ferrous iodide. A syrup which keeps perfectly may be made as follows: Iron, in the form of fine bright wire, cut in small pieces, 25·0 Gm.; iodine, 41·5 Gm.; syrup, distilled water, each, a sufficient quantity to make 1,000 Gm. Introduce the iron into a 500 c.c. boiling flask, and wash well with water several times, then add to it 150 c.c. of distilled water, and afterwards the iodine. Shake the mixture occasionally, and when the solution has acquired a greenish colour and is free from the odour of iodine boil it for 5 minutes. Then filter it through a folded filter paper placed in a funnel, the point of which dips below the surface of 700 Gm. of syrup contained in a

tared bottle. When the liquid has run through wash the flask and filter with a mixture of 25 c.c. each of syrup and distilled water previously heated to the boiling point, then remove the funnel and add sufficient syrup to make the product weigh 1,000 Gm Keep the syrup in small, well-stoppered bottles [exposed to bright light.—Ed. *Y.B.*].

Tablet Making. (*Pharm. J.*, 1910 [4], **31,** 123; and W. Mosley, *ibid.*, **32,** 6.) A series of practical instructions in tablet-making, enabling the pharmacist to prepare his own tablets with facility. Illustrations of simple apparatus requisite for this purpose are given.

Tablet Making, Practical Notes on. David Dunnet. (*Chem. and Drugg.*, 1911, **78,** 206.) Granulating the material in the usual method with a mixture of equal parts of mucilage of acacia, syrup (or syrup of glucose), and water, then drying, and perhaps afterwards spraying with a solution of liquid paraffin in ether, is quite impracticable as regards speed. It is, however, advisable where tablets are often called for containing varying proportions of phenacetin, salicin, and acid acetyl-salicyl, etc., to keep those substances ready granulated. They can then be easily weighed out and mixed lightly with the addition (if necessary) of a few grains of French chalk to facilitate the running of the granules through the hopper of the machine and to prevent the mixture sticking to the dies. Woolcock showed (*Y.B.*, **1908,** 319) finely powdered boric acid is preferable to French chalk, if a clear solution of the tablet is required. Crystalline salts, such as KI, AmBr, salol, and hexamethylenetetramine, are peculiarly suitable for compression without any excipient; but the majority of drugs, and especially fine dry powders, require either a binding agent, a lubricant, or a disintegrator, and perhaps may need them all. The following is a list of suitable agents, and they are placed in each division in the order of what I have found to be, in my experience, the most useful.

Absorbents: Pulv. rad. althææ; pulv. glycyrrhizæ.

Lubricants: Pulv. theobrom. co. (White and Robinson); pulv. cretæ gallic; pulv. cacao; pulv. acid. boric. (subtil.).

Binders: Pulv. gum. acaciæ; pulv. theobrom. co.; pulv. sacch. alb.

Disintegrators: Pulv. amyli; pulv. theobrom. co.; pulv. maranta.

Diluent of potent remedies; Pulv. sacch. lact.

Compound theobroma-powder is the best agent of all, and was recommended several years ago by White and Robinson. It is made by melting one part of oil of theobroma and then adding three parts of powdered starch. It acts as a lubricant and partial binder of the material, and finally, when swallowed, as a disintegrator of the tablet. One-half to 1 grain per tablet is generally required. A theobroma emulsion has since been recommended; but is not so handy at the dispensing-counter.

French chalk is occasionally of great service in getting the material to run through the hopper and feed evenly into the dies. It should be used sparingly, however, as otherwise it is apt to cause trouble by "capping"—that is, when two compressions are necessary you sometimes get two tablets instead of one. It is also very useful for rubbing the punches after every few tablets when there is a sticky ingredient present, and if the tablets are light in colour. Cocoa-powder is a good lubricant, but unless prescribed is only permissible where the tablets are dark in colour, as one of the three valerianates would be. It is the very thing for rubbing the dies in making tablets containing large proportions of dark and sticky vegetable extract-powders. It also can be used as a flavouring-agent in formulæ such as the following, which make pleasant and efficient laxatives for children :—

I.—Phenolphthalein, gr. ij; pulv. cacao, gr. ij; pulv. gum. acaciæ, gr. j; Fiat. tab.

II.—Pulv. rhei co., gr. iss; hyd. c. creta, gr. ss (or more); sodii bicarb., gr. iss; pulv. cacao, gr. ij; pulv. gum. acaciæ, gr. j; Fiat. tab.

Gum acacia is used where the material does not possess sufficient cohesive power to compress, and although sugar is sometimes used for this purpose, it is apt to cause trouble by sticking to the dies. When a sweetening agent is required saccharin is preferable. Arrowroot, as it compresses readily, is also useful for running through the machine and making it cleaner than mere rubbing with a cloth may do. When the dies are not in use they should be kept coated with soft paraffin to prevent rust. The following is an example of a formula which requires no addition whatever, as the ingredients combine to make a perfect tablet, although to try and make a tablet from pepsin or soda alone would be somewhat troublesome. When pepsin is prescribed, the scale variety rubbed down is preferable to the powdered kind. Pepsini, gr ij (binder); salol. gr. ij (lubricant); sod.

bicarb., gr. ij. With the exception of throat tablets, which have to be sucked slowly and ought consequently to be made hard, the perfect tablet is one that is easily friable between the fingers, and yet not readily broken when thrown upon the counter. It is not possible to get a tablet like that with crystalline salts, but if arrived at with other materials there is no fear of the tablet not breaking up in the stomach. An absorbent will only be required where there is a deliquescent or hygroscopic ingredient present, such as carbolic acid or pepsin; or a fatty one, such as lecithin. For ½ grain of carbolic acid, 1 grain of marshmallow-powder would likely have to be added, the amount, however, depending largely upon the nature of the other ingredients.

Synthetic Remedies.—A fair tablet can generally be made by the addition of ½ grain of compound theobroma-powder and ½ grain of powdered gum acacia to each 5 grains of substance.

Tablets of Acids and Alkali Carbonates, Preparation of. (*Pharm. Zeit.*, 1911, **56,** 27.) E. Dieterich has been granted a patent in Germany for an improvement in tablets containing acids and alkali carbonates. This consists in the addition of 1 to 4 per cent. of a dehydrating agent such as anhydrous Na_2SO_4. This addition is claimed to greatly increase the permanency of such tablets as those containing mixtures of sodium bicarbonate with citric or tartaric acid. Sodium chloride and magnesium chloride are stated to possess similar properties.

Tablet Triturates. J. Linhardt. (*Drugg. Circ.*, 1911, **55,** 124.) Milk sugar is the most generally used vehicle, although other substances, such as sugar, starch, extract of licorice, and NaCl are used when necessary; the latter mostly in the preparation of tablets of corrosive sublimate. Although diluted alcohol (49 per cent.) will answer in most cases as a moistening agent, different medicaments require different treatment. Care should be taken to choose a moistening agent in which one or more of the tablet ingredients is soluble, so as to promote adhesion. Water, EtOH, Et_2O and $CHCl_3$ are used at times, alone or mixed, the latter two requiring rapid manipulation. To make a perfect tablet triturate it is essential that only finely powdered drugs be used, so as to ensure a smooth surface. Many pharmacists use talc over the tablets while still in the mould to obtain a smooth surface, but this practice is to be condemned. The ordinary sugar of milk is not powdered finely enough for the preparation

of triturate tablets, and should be bolted through a very fine sieve to remove the coarser particles. The amount of moistening agent used plays an important part in tablet manufacture, and varies greatly according to the ingredients. The more menstruum used the harder, denser, and heavier the tablet becomes, and *vice versa*. The proper amount can be gauged only by experience, but enough should be added to make the mass sufficiently cohesive, but not too plastic. Experiments should be made with milk sugar alone. Hardness can be judged by crushing the tablet under the thumb sideways on the tile. A tablet should crumble without much exertion, but should be sufficiently hard not to break or chip when dropped to the floor. When the operator can make good sugar of milk tablets he can then make many tablets of which sugar of milk is the main component. After the first step is learned, the operator should ascertain accurately the weight of one mould full of dry tablets. This should be noted and preserved for future reference. This, of course, varies with the amount of diluent used, which should also be ascertained and noted.

With the data the operator can make tablets in which sugar of milk is the main constituent, the weight and bulk of which is not materially affected by the added drug. By just weighing out the necessary amount of medicament and adding sugar of milk to the required weight, and proper trituration and addition of solvent, the mould can be filled and then the tablets may be expelled and allowed to dry. Care should always be exercised not to use a filling tool that will have a chemical action upon the drugs. A common mistake is making tablets too wet. This causes shrinkage and produces tablets which are not uniform. Therein also lies a serious danger when the active ingredient is soluble in the menstruum, which oozes out on the under side and, containing most of the active principle, is left behind on the tile, with the result that the tablet is deficient in strength. When the active constituent is of a higher gravity than milk sugar, as is the case with HgCl and other mercurials, lead and bismuth compounds, etc., the loss in bulk must be made up by the addition of sugar of milk; and the quantity of sugar of milk must be lessened when the active ingredient is lighter. Failure to observe these points accounts for the shortage or left over mass. Certain combinations can be made into tablets only by compression, and separate granulation and subsequent mixing, for if mixed all together and moistened, chemical reaction occurs.

A good example of this class of combination is HgCl and $NaHCO_3$. Tablets should never be subjected to high temperature in drying, especially when the medicament is of a volatile nature, or soluble in the solvent used. This is particularly true of tablets which are other than white, for the evaporation quickly taking place from the exposed side, the solvent draws the colour to that side, which, therefore, when dry, will be darker than the under side. A good drying cabinet can be made with little expense out of an ordinary box without bottom, one side of which should be hinged to serve as a door. Cleats are nailed to the sides to serve as rests for frames. The frames are made from narrow strips to slide easily into the box and rest on the cleats. These are covered with ordinary cheese cloth so as to form a sieve. The box should have an air vent to allow escape of moisture at the top. Such a drying cabinet, used over a register or steam radiator, is most serviceable, and permits an even drying of the tablets. The tablets are distributed over the cheese cloth and so inserted into the cabinet. Wire sieves are not so good, as they are apt to rust and affect the tablets.

Terpin Hydrate, Compound Solution of. F. W. A. Hain. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1259.) Terpin hydrate in powder, 25 Gm.; glycerin, 650 c.c. Heat together and stir until dissolved. Then add fluid extract of cherry bark, 62·5 c.c.; alcohol, 235 c.c.; glycerin to make 1,000 c.c. Dose, 4 c.c.

Thyroid Extract, Preparation of. S. P. Beebe. (*Amer. J. Pharm.*, 1911, **83.**) The thyroids of the pig, sheep, or ox are used. Only normal healthy, not unduly large, glands are selected. It is noted that sheep's glands are more likely to be enlarged from goitre than those of the pig or ox. Where the glands are sold by weight, the selection of the largest is to be guarded against. The glands are obtained as fresh as possible, and are kept from autolysis by freezing. They are ground to a fine pulp, and extracted with three to four times their volume of normal saline solution made very faintly alkaline by NaOH (three or four drops of a 10 per cent. NaOH solution to every litre of salt solution). The extract is shaken vigorously at room temperature for 1 or 2 hours, and then transferred to the refrigerator for 12 to 18 hours. The product is filtered first through gauze, and then through paper pulp by means of a Buchner funnel. The filtrate contains a variety of proteids and proteid

fragments ; it is acidified with acetic acid and heated to 44°C. for 10 minutes. Extracts of the different species of glands behave in characteristic fashion. Extract of sheep glands gives a scanty precipitate or none at all in the cold ; such as does form may be filtered out, and is found to be richer in iodine than any fraction obtained subsequently. On heating an abundant flocculent precipitate is obtained at 44°, containing more iodine than any proteid obtained from the filtrate heating to a higher temperature, and is by far the most abundant proteid in the gland. Further precipitates may be obtained successively at 65–70°, at 82–86°, and after boiling for some time, but these contain iodine in relatively much less amount than in the precipitate at 44°C. If the whole gland extract is used for therapeutic purposes it follows that all of the various iodized fractions are administered, but some of these substances not only give no beneficial therapeutic action, but are actually harmful. The results of experiments on guinea-pigs show that the second and fourth fractions are toxic, i.e., those obtained at 65–70°, and after boiling. It is further shown that the human thyroid is by far the best for the human subject ; there is no other substance which acts so economically and efficiently as the proteid precipitated from extracts of normal human thyroid glands by acetic acid and heat to 44°C. For such reasons only the proteid obtained by the similar method from animal glands should be used. Accordingly the original precipitate is washed repeatedly with normal saline by decantation or centrifugation, until the wash water is free from biuret-reacting substances. It is then dissolved by the addition of a little NaOH, the solution filtered through a thick paper mat, and again precipitated by acidifying with acetic acid. The washing process is repeated, and the final washed precipitate centrifugated or filtered out and dried at low temperature, or it may be kept in solution, and after filtration through a Berkefeld, kept for hypodermic administration. But the iodine content of thyroid glands shows wide variations, and therefore before being used therapeutically it is essential that the proteid should be standardized on the basis of its iodine content. The proteid obtained from normal human glands is taken as the standard. One Gm. of the purified proteid from normal human thyroid glands contains 3·384 milligrammes of iodine. After the purified proteid from the animal glands is obtained, its iodine content is determined and, regardless of whether this proteid is richer or poorer in iodine than the

standard, it is considered that each 3·384 milligrammes of iodine represent 1 Gm. of the active thyroid proteid.

For administration, the proteid is diluted with the appropriate amount of lactose and made up into 2 grain tablets, different strengths of which are prepared, 1, 2, and 5 per cent. being a sufficiently wide variation in strength to answer all the usual requirements. The 1 and 2 per cent. tablets are used almost entirely in the treatment of various types of goitre ; the stronger 5 per cent. tablets are reserved almost exclusively for different metabolic disorders, such as various skin lesions, myxœdema, cretinism, or those conditions in which there is a remarkably deficient thyroid activity. For hypodermic use solutions of the proteid in varying strengths, standardized on the iodine basis, are put up in sealed glass tubes. This method of preparing and standardizing thyroid is superior to any method now in vogue, gives all of the physiologically active portions of the gland, and contains none of the toxic, deleterious substances contained in the whole extract.

Tinctures, Comments on, by the U.S.P. Committee of the Amer. Pharm. Assoc. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 782.) Instead of a uniformity of 1 of the drug in 10, it is suggested that the quantity of drug may be varied so as to have a uniformity of dose. The making of tinctures from fluid extracts, stated to be prevalent, is condemned. *Tincture of nux vomica* made from extracts varies in colour and invariably deposits. It is much better made direct from the drug, using a menstruum of alcohol 3 and water 1. Several tinctures examined have had a marked odour of acetic ether.

Unguentum glycerini. P. G. Unna and P. Unna, jun. (*Pharm. Zentralh.*, 1911, **52,** 169.) The following formula is proposed for the next Ph. G. : Anhydrous eucerin, 1 ; glycerin, 4.

Unguentum paraffini, Improved Formula for. T. Dunlop. (*Pharm. J.*, 1910 [4], **31,** 388.) The addition of 5 per cent. of wool fat is recommended to the mixture of hard and liquid paraffin. This gives an ointment of homogeneous, plastic consistence. The proportions used are : Hard paraffin, m.p. 56°C., 8 ; liquid paraffin, sp. gr. 0·880,12 by weight ; wool fat, 1. Incidentally, it is noted that Unguentum paraffinum molle is a bad diluent for Ung. hyd. nit. ; that Ung. paraffini is a bad basis for Ung. acid. carbolic ; and that liquid paraffin is a bad diluent for hard paraffin.

Unguentum solubile. A. Stephan. (*Apoth. Zeit.*, 1911, **26**, 274.) A tragacanth mucilage with glycerin is used as the basis for a series of non-fatty "ointments" as follows. *Unguentum solubile.*—Tragacanth in powder, 3; suspend in alcohol 90 per cent., 5; then mix with glycerin, 50 by weight; and add distilled water, 42. Rose otto or other perfume may be added when this is used as a cosmetic cream. *Unguentum solubile anhydricum*, as above (without water), must be freshly prepared, as it soon sets to a stiff consistence. *Ung. solubile zinci oxidi* 1 : 5.—Tragacanth, 1; alcohol, 4; rub together and add gradually zinc oxide, 20; glycerin, 20; previously triturated together; then gradually add rose water to make 100. *Ung. solubile ichthyoli* 1 : 10.—Anhydrous ung. solubile, 50; mix with a solution of ichthyol, 10; in distilled water, 40. *Ung. hydrogenii peroxidi* 1 : 2, *Oxidizing ointment.*—Anhydrous ung. solubile and hydrogen peroxide, equal parts. *Ung. solubile aluminii acetici* 30 : 100, *Cooling ointment.*—Anhydrous ung. solubile, 50; solution of alumium acetate, 30; distilled water, 20. *Ung. solubile veratrinæ*, 4 : 100.—Veratrine, 4; dissolve in $CHCl_3$, 10, and mix with unguentum solubile to make 100. *Ung. solubile mentholi* 3 : 100.—Menthol, 3; dissolve in alcohol, 6; and add ung. solubile to make 100. *Ung. ammonii iodidi solubile.*—Ammonium iodide, 10; dissolve in water, 10; mix with ung. solubile to make 100. *Ung. iodi solubile* 3 : 100.—Ung. solubile, 7; tincture of iodine 1 : 10, 3. *Ung. iothioni solubile* 1 : 4.—Ung. solubile, 3; iothion, 1. *Ung. protargoli* 1 : 100.—Ung. solubile, 45; freshly prepared solution of protargol 1 : 10, 5. *Ung. ammonii salicylati solubile* 1 : 10.—Salicylic acid, 10; mix with solution of ammonia 1 : 5, 6·2; and add ung. solubile to make 100. *Ung. solubile salicylatum* 1 : 20.—Salicylic acid, 5; dissolve in alcohol, 32; in 5 of this solution suspend tragacanth, 3; mix intimately with glycerin, 46; then add distilled water, 16; and lastly the rest of the alcoholic solution of salicylic acid. *Ung. solubile salicyl. c. chloroform.*—Mix ung. solubile salicylatum 1 : 20, 9; with chloroform, 1. *Disinfectant nasal ointment.*—Menthol, 2; dissolve in alcohol, 5; mix with anhydrous ung. solubile, 45; then add solution of boric acid 3 : 100, 48. Frequently prescribed with cocaine and adrenine. *Ung. solubile acidi borici* 1 : 10.—Boric acid, 10; dissolve in glycerin, 40; mix with a trituration of tragacanth, 3; in alcohol, 4; and add distilled water, 43. Not to be kept in collapsible tubes. *Foot ointment.*—Ung. solubile, 6; soft soap, 3; formaldehyde solution, 1. *Oint-*

ment for hyperhydrosis.—Ung. solubile, 97 ; formaldehyde solution, 3 ; perfume with oil of geranium or other odours. *Ung. hydrarg. alb, solubile.*—Moist precipitate of ammoniated mercury, 1 ; ung. solubile, 9. *Ung. solubile sulphur. precip.* 1 : 10.—Moist precipitated sulphur, 1 ; ung. solubile, 9. *Ung. sulphoform* 1 : 10.—Sulphoform, 1 ; rub down with glycerin, 1 ; adding ung. solubile, 8. *Kummerfeld's ointment.*—(1) Moist precipitated sulphur, 1 ; ung. solubile, 5 ; lime water, 4 ; spirit of camphor, 1. (2) Moist precipitated sulphur, 1 ; ung. solubile, 6 ; spirit of soft soap, 2 ; spirit of camphor, 1. *Phillipson's mixture.*—Ung. solubile, 17 ; glacial acetic acid (96 per cent.), 1 ; spirit of camphor, 1 ; simple tincture of benzoin, 1. *Chilblain ointment.*—Camphor, 7·5 ; dissolve in warm olive oil, 10 ; when cold mix intimately with tragacanth, 3 ; add solution of tannin in glycerin 1 : 4, 70 ; distilled water, 40 ; then mix in tincture of opium, 10 ; and Peruvian balsam, 10. *Disinfecting ointment.*—Mercuric chloride, 3 ; sodium chloride, 3 ; dissolve in water, 300 ; add anhydrous ung. solubile, 500 ; and alcohol, 200. *Lip salve.*—Ung. solubile, 9 ; white vaseline, 1 ; red colour, q.s. *Depilatory ointment.*—Barium sulphydrate, 1 ; rub down with precipitated chalk, 2 ; and mix with ung. solubile, 17. *Itch ointment.*—Naphthol, soft soap, alcohol, of each 3 ; dissolve with heat and add ung. solubile to make 100.

NOTES AND FORMULÆ

Airol Ointment for Recent Wounds and for Leg Ulcers. K. Gerson. (*Apoth. Zeit.*, 1910, **25,** 1015.) Airol, 5 ; yellow soft paraffin, 95 ; make an analgesic antiseptic ointment for direct application to fresh wounds. The addition of camphor, 1, to the above renders it valuable for crural ulcers, the camphor stimulating granulation.

Alcohol, Commercial, and the U.S.P. Standards. S. L. Hilton. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 958.) Alcohol that is stored in wooden drums will always show the presence of a trace of tannin by the official test ; and if kept for any length of time in the barrel, of oxidation products as well. The U.S. Inland Revenue regulations require distilled spirit to be transported in those wooden barrels known as distiller's packages, but special vessels of metal, glass, or earthenware may be used, by special sanction, if enclosed in a wooden case. It is suggested that for pharmaceutical spirit a special permit to use such vessels as

glass carboys enclosed in wood or tinned iron drums should be obtained. Tables showing the results of the examination of 15 samples of spirit are given.

Alum, Solubility of, in Mixtures of Glycerin and Water. T. Dunlop. (*Pharm. J.*, 1910 [4], **31,** 6.) The fact that a prescription for a mixture of alum, liquid carbolic acid, glycerin and water, showed a crystalline deposit of alum, directed attention to the fact that both ammonia and potash alums are less soluble in mixtures of glycerin and water than in either of the two liquids separately. The addition of glycerin to strong aqueous solutions of these two alums causes separation of crystals at normal temperatures. Also the addition of water to the official Glycerinum aluminis, has a similar effect. The solubility of iron and chrome alums in water is not thus affected by the addition of glycerin.

Aluminium Acetate for Waterproofing. (*Journ. Pharm. Chim.*, Append., 1911, **3,** xxxviii.) A. Balland reports, in the *Revue du service de l'intendance militaire*, on the different experiments made to waterproof army clothing. The Minister of War has selected aluminium acetate, which may also be applied to the treatment of tents. The commercial liquid acetate, which generally occurs on the market as a solution of sp. gr. 1·044 to 1·052, is mixed with water in the proportion of 1 litre of the acetate liquid and 40 litres of water. The fabric or made clothes are immersed in this liquid about 24 hours, moving them about occasionally to make sure that every part is thoroughly saturated. All metal buttons and hooks must first be removed. The articles are then drained and finally dried in the shade, either in the open air or in a well-ventilated shed.

Antiseptic Liquid Dentrifice. (*Drugg. Circ.*, 1911, **55,** 128.) Thymol, 2·5 ; benzoic acid, 25 ; tincture of eucalyptus, 125 ; oil of peppermint, 8 ; alcohol 90 per cent., to make 1000.

Barium Oleate as a Rat Poison. A. Gawalowski. (*Zeitschr. des Allgem. oesterr. Apoth-Vercin.* ; *Austral. J. Pharm.*, 1911, **26,** 39.) Barium oleate is preferred to $BaSO_4$, $BaCO_3$ or $BaCl_2$, which are either inactive, do not act quickly enough, or are not taken readily because of the bitter taste. It is prepared by treating a filtered solution of household soap with a solution of $BaCl_2$ or $Ba2NO_3$. After allowing the mixture to stand,

the clear liquid is decanted and the precipitate collected. The oleate thus obtained is made into a paste with soft soap, with the addition of some anise oil and sugar; or it may be mixed with butter, lard, or other suitable fat, along with some meal and anise oil. Jam may also be used as a vehicle. These preparations may be used as they are, or spread on bread.

Bay Rum. F. T. Gordon. (*Drugg. Circ.*, 1911, **55,** 183.) The original bay rum is said to have been made by macerating *Myrcia acris* leaves in native rum. Afterwards, fresh *Myrcia* leaves were bruised and distilled with raw rum. But now the oil is distilled and dissolved in cheap alcohol obtained from the sugar plantations. Genuine bay rum was not yellow, but colourless, or has a pale, greenish yellow tint. This colour was obtained by macerating a few "bay" leaves in the distillate, but to make the product look "stronger" some distillers added turmeric to deepen the colour. The following is a working formula which will give a satisfactory preparation: Oil of bay (*Myrcia acris*), 5; oil of pimenta, 1; oil of orange, 1; alcohol, 400; water, 400; West India (Santa Cruz) rum, 200.

Dissolve the oils in the alcohol, add the rum, then the water, and, after a few hours, filter. No colouring is needed. If a stronger article is wanted, the amount of oil of bay may be increased to 6 c.c.

"Black Ointment," Schaeffer's. (*Apoth. Zeit.*, 1911, **26,** 319.) For crural ulcer Schaeffer prescribes the following "Schwarzsalbe": Silver nitrate, 0·03 to 0·1 or 0·3; Peruvian balsam, 1·5 to 3; zinc oxide, 3; yellow vaseline to 30. When the weaker ointment gives rise to no irritation, the strength may be increased gradually up to 2 per cent. of $AgNO_3$ and 20 per cent. of Peruvian balsam.

Boiler Composition. — Balland. (*Revue Service Militaire*; *Répert. Pharm.*, 1910, **22,** 308.) Sodium carbonate (soda ash), 20·3; extract of logwood, 5·2; extract of quebracho, 5; water, 76. This is the formula of the Eastern Railway Company of France, and has been adopted by the Minister of War for use in French Government establishments. The maximum dose is 30 Gm. per cubic metre of water for each degree of hardness. It is preferable to use half this amount at first and modify the quantity according to observed results. The composition should

be used regularly, once daily, either morning or evening, and before running it in the previous day's deposit should be blown off as far as possible. This blowing off the sludge should be very thoroughly done once a week, and once a month the boiler should be well flushed out with plenty of water.

Boot Dressings. (*Chem. and Drugg.*, 1911, **77**, 354.) The following formulæ are translated from Buchheister's "*Vorschriftenbuch für Drogisten*":—

	1	2	3	4	5	6	7	8	9	10	11
Carnauba wax	10	7	—	—	5	350	—	4	—	5	4
Yellow wax	—	—	18	15	10	—	30	—	—	10	—
Ceresin	24	9	—	—	30	100	—	40	50	35	36
Japan wax	—	—	—	—	5	78	—	—	50	—	10
Paraffin wax	—	3	—	—	—	—	—	—	—	—	—
Black Montan wax	—	—	—	—	—	—	—	4	—	—	—
Resin	16	1	—	—	—	100	—	—	—	—	—
Hard soap	—	—	2	5	—	—	12	—	—	—	—
Wool fat	—	—	—	—	—	—	—	2	—	—	5
Venice turpentine	—	—	—	—	—	50	—	—	—	—	—
Turpentine oil	—	—	40	40	160	850	100	120	180	130	50
Turpentine substitute	150	—	—	—	—	—	—	—	—	—	—
Resin oil	—	60	—	—	—	—	—	—	—	—	—
Pine oil	—	—	—	—	—	150	—	40	—	—	100
Water	—	—	40	40	—	—	100	—	—	—	—
Glycerin	—	—	—	—	—	100	—	—	—	—	—
Spirit	—	—	—	—	—	—	7·5	—	—	—	—
Nigrosin, oil-soluble	—	—	—	—	—	—	—	3	1	3	2
Lamp black, finest	—	—	—	—	—	—	—	2	—	2	3
Nankin brown	—	—	—	—	—	—	1·5	—	—	—	—

Where no colouring-matter is indicated, use an oil-soluble aniline dye, with or without lamp-black, according to the colour required. The proportions of the dyes can be judged by those given in the last five formulæ.

The following formulæ illustrate the emulsified variety of boot-creams:—

(12) Potash, 25; borax, 7·5; water, 807·5; dissolve and add carnauba wax, 125; resin, 25; ceresin, 10; boil till a homogeneous cream results.

(13) Soda crystals, 30; water, 300; dissolve and add, Marseilles soap, 3; boil and add resin, 4; yellow wax, 25; carnauba wax, 15. Continue the heat until the mixture is uniform, then add cream of tartar, 5; turpentine, 25.

(14) Paraffin wax, 20 ; wool fat, 10 ; soda lye sp. g. 1·360 ; boil together 20 minutes and add carnauba wax (cut small), 20 ; nigrosine (fat soluble), 4. After standing, incorporate hot water, 150 ; and when the mass is uniform, add gradually the following mixture : nigrosin (water-soluble), 4 ; formalin, 0.5 ; hot water, 100.

The white variety of boot-dressing is made as follows :—

(15) White ceresin, 15 ; refined carnauba wax, 10 ; melt and add turpentine oil, 60 ; then incorporate the following mixture : zinc white, 10 ; ultramarine, a trace ; turpentine, 20.

Boric Acid and Glycerin. W. Duncan. (*Pharm. J.*, 1911 [4], **32,** 104.) The familiar interaction between borax, glycerin, and $NaHCO_3$ resulting in the liberation of CO_2, is the starting point of a very complete treatise on the subject. It is noted that boric acid attacks carbonates much more readily in presence of glycerin than when alone ; probably this is due to the formation of a monobasic glycerol-boric acid, $C_3H_5OHBO_2OH$. The reaction which occurs when titrating solutions of borax in presence of excess of glycerin, with N/NaOH to neutrality to phenolphthalein is explained by the equation

$$Na_2B_4O_7 + 4C_3H_5OOH + 2NaOH = 4NaC_3H_5OHBO_3 + 15H_2O$$

in which 2 mols. NaOH = 1 mol. $Na_2B_4O_7$.

Byrolin. E. Seel. (*Pharm. Zeit.*, 1911, **56,** 352.) This antiseptic cream is found to consist of water, 50·6 ; glycerin, 6·7 ; boric acid, 3·0 ; ash, 1·38 ; lanoline, 12·9 ; and soft paraffin or paraffin ointment, 26·8. Possibly a little soap, or eucerin, is present, to aid the incorporation of the water.

Castor Oil, Methods of Administering. (*Formulary of Bull. Sci. Pharm.*, 1911 [6], 138.) Castor oil, syrup of orgeat, peppermint water, equal parts. (2) Castor oil, 2 to 10 Gm. ; yolk of 1 egg ; mix intimately and add tepid water, 80 c.c. ; orange flower water, 20 c.c. This is suitable for children. (3) Castor oil, 4 to 10 Gm. ; glycerin, 10 Gm. ; peppermint water, 5 Gm. ; oil of peppermint, 2 drops. (4) Castor oil, 30 Gm. ; cognac, 5 Gm. ; saccharin, 0·25 Gm. ; oil of anise, 30 drops.

Cement Paste, Dreuw's. (*Pharm. Zentralh.*, 1911, **52,** 169.) Sulphur, 10 ; ichthyol, 5 or 10 ; Lassar's paste, to 100.

Centrifuge, Home-made Electric. A. S. Brumbaugh. (*J. Amer. Med. Assoc.*, Feb., 1911; *Pharm. J.*, 1911 [4], **32,** 432.) The method of converting an electric fan into a centrifuge is described and illustrated.

Cod-Liver Oil Emulsion with Glycerin. O. Richter. (*Suedd. Apoth. Zeit.*, 1911, 28; *Pharm. Zeit.*, 1911, **56,** 363.) The following is stated to produce an emulsion similar in character to a much advertised proprietary preparation. Powdered gum acacia, 2; powdered tragacanth, 3, are rubbed down thoroughly in a dry mortar with glycerin 50. This suspension is then poured into cod-liver oil, 150, previously weighed in a 500 c.c. bottle. After thorough shaking, a solution of calcium hypophosphite, 4; sodium hypophosphite, 2; in cold water, 129; is added at once, and the whole thoroughly emulsified by shaking. Finally any desired flavour may be added previously dissolved in a little alcohol.

Cod-Liver Oil, Ferrated. K. Feist and W. Auernhammer. (*Pharm. Zeit.*, 1910, **55,** 907.) Linseed oil, 140; KOH solution (25 per cent.), 107; alcohol 90 per cent., 30; solution of Fe_2Cl_6, sp. gr. 1·280, 100; ether, 250; distilled water, q.s.; cod-liver oil to make 1,000. The linseed oil, KOH solution and alcohol are heated together with some water. When saponification is complete the soft soap is dissolved in water, 1,500, then added to the Fe_2Cl_6 solution, previously diluted with water, 500. After standing for some hours, the precipitated ferric linoleate is collected, dissolved in ether, and dried by shaking with anhydrous Na_2SO_4. The ether is then distilled off, and the residue dissolved in sufficient cod-liver oil to make the weight 1,000. This oily solution contains 1 per cent. of Fe, and is to be diluted to the prescribed strength, as required.

Complexion Balms. (*Amer. Drugg.*, 1911, **58,** 74.) I.—Tincture of tolu, 1½ fl. oz.; rose water, 16 fl. oz.; M. II.—Tincture of benzoin, 1½ fl. oz.; sodium carbonate, 75 gr.; eau de cologne, 16 fl. oz.; M. III.—Sodium borate, 2½ dr.; sodium carbonate, 75 gr.; rose water, 6 fl. oz.; tincture of benzoin, 1 fl. oz.; eau de cologne, 8 fl. oz.; M. A tablespoonful of either of the above to be added to the water before washing.

Cooling Ointment, Koch's. (*Pharm. Zentralh.*, **1911, 52,**

543.) Bornyl acetate, 5 ; lead acetate, 3 ; mucilage of maize starch, 25 ; benzoated lard, 40 ; wool fat, 40.

Corks rendered Impervious with Cellulose. L. Pink. (*Apoth. Zeit.*, 1911, **26,** 48.) The corks are first macerated in a cuprammonium solution of cellulose. The Cu is then removed by treatment in an acid bath. The residual cellulose is finally converted into parchment by immersion in H_2SO_4 of suitable strength. Corks thus treated are claimed to be more resistant than those impregnated with paraffin ; and they may be softened before use by immersion in boiling water. The process is patented in Germany.

Digestive Cachets. (*Nouveaux Remèdes Formulary*, 1910, **27** [22].) Pepsin, amylaceous, 0·20 Gm. ; pancreatin, amylaceous, 0·20 Gm. ; diastase, 0·20 Gm. ; calcium glycerophosphate, 0·10 Gm. ; powdered nux vomica, 0·02 Gm. For one cachet. One to be taken after each meal.

Dry Shampoos. (*Drugg. Circ.*, 1910, **54,** 643.) (I) Eau de cologne, 100 ; spirit of soap, 500 ; acetic ether, 5 ; terpineol, 1 ; oil of bergamot, 2 ; glycerin, 100 ; ammonia water, 2 ; alcohol, 200. Distilled water, enough to make 2,000. (II) Borax, 20 ; potassium carbonate, 10 ; ammonia water, 10 ; water, 500 ; oil of bergamot, 2 ; oil of geranium, 1 ; alcohol, enough to make 1,000.

Duret's Ointment. H. Helch. (*Pharm. Post*, **1910,** 830.) Precipitated sulphur, 8 ; coal tar, 15 ; wool fat, 32 ; are heated together for a short time at 130°C. When cool, camphor, 12 ; chaulmoogra oil, 3 ; yellow soft paraffin, 30, are added.

Electric Cataplasm. J. Marcuse. (*Nouveaux Remèdes*, 1911, **28,** 13.) The cataplasm consists of a soft pliable knitted fabric containing a system of resistance wires. Insulation is obtained by means of glass beads. The wires are placed between layers of asbestos. The apparatus can be attached to any source of current, not exceeding 120 volts in tension, and the heat can be exactly adjusted to any required degree by regulating the flow of current. The cataplasms are made of different shapes to fit different parts of the body.

Ergot propagated by an Insect. Mercier. (*Bull. Soc. Biol.*, 1911, **70,** 300 ; *Bull. Sci. pharm.*, 1911, **18,** 381.) The author has

observed the conidia of a *Clavicaps*, probably *C. purpurea*, on a dipterous insect, *Sciara thomæ*. These are either attached to the outer surface of the insect; or being swallowed are disseminated in the dejecta. Probably insects play as important a part in disseminating disease among plants as they do among animals.

Essential Oils, Preserving, with Fixed Oils. C. H. La Wall. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1121.) The addition of a small amount, from 1 to 10 per cent., of fixed oil, such as cotton-seed or olive oil, retards the oxidation changes which occur in the aurantiaceous and other oils. Such an addition would not be objectionable where the essential oils are dissolved in alcohol, since the fixed oil would be insoluble. Experiments with oils of lemon, orange, lavender and peppermint, mixed with 5 to 10 per cent. of olive oil and kept under similar conditions beside portions unmixed, have demonstrated the preservative effect of the admixture.

Formaldehyde, Disinfecting Rooms with. S. G. Dixon. (*Amer. J. Pharm.*, 1910, **82,** 327.) In using formaldehyde gas for disinfection, the air of the room should be both warm and moist. The latter condition may be effected by suspending wet sheets about the room. An effective and economical method of generating this gas is by the addition of the official U.S.P. solution of formaldehyde (37 per cent. by weight) to $KMnO_4$. Eight ounces of commercial $KMnO_4$ is required for each 16 fl. oz. of the solution of formaldehyde in disinfecting every 1,000 cubic feet of air space. The following are the details to be observed: (1) Obtain an enamelled tin or iron pail with a flaring top, which has a capacity at least equal to ten times the quantity of disinfectant to be used. (2) Place the $KMnO_4$ in the pail, spreading it evenly over the bottom. (3) Set the pail with the crystals in a pan, metal wash-tub or boiler containing water, a brick, or a stone lid being placed under the pail. (4) Pour the formaldehyde solution from a wide-mouthed vessel over the permanganate. (5) Seal the door of exit, including the keyhole, and crevices about the door knob. This must be done quickly, as 80 per cent. of gas is liberated during the first 5 minutes. (6) Leave the room closed for 6 hours. There must be no live fire or flame in the room, as the gas liberated is slightly inflammable. A suitable generating

apparatus, as used by the Pennsylvania State Department of Health, is described, and shown in an accompanying illustration.

Fruit Jelly Making. N. E. Goldthwaite. (*J. Ind. Eng. Chem.*, 1910, **2,** 457; *J.S.C.I.*, 1910, **29,** 1404.) Experiments on the proportion of sugar to fruit juice show that very frequently too much sugar is used in jelly-making. As sugar is increased the time necessary for boiling decreases, the volume of jelly increases, and its structure becomes less coherent. In general, three parts of sugar to four of juice is best. The investigation of the degree of sugar inversion most desirable has not led to any results. It seems immaterial whether the sugar and juice be boiled together all the time (much inversion) or only mixed shortly before setting (little inversion). No difference of importance could be detected between the jellies made with beet sugar and with cane sugar. If the fruit juice is boiled for a very long time, the acid will hydrolyse the pectin and no jelly can be formed. The juice of raw fruits is sometimes free from pectin, and always contain much less than that from the cooked fruits. In the case of oranges and lemons the white inner skin seems to be the important source of pectin, and should therefore not be rejected in jelly-making. The outer yellow skin renders the jelly bitter and marmalade-like. Irregular results are always observed in making jellies of strawberry and cherry juice. In these cases the temperature of the boiling liquid must be raised about 2°C. above the temperature at which the jelly-test is first observed.

Gray's Glycerin Tonic Compound. P. H. Utech. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1262.) First prepare the following: *Concentrated Tincture.*—Gentian root, 3 oz.; taraxacum root, bitter orange peel, āā 4 oz.; caraway seed, coriander seed, āā 4 dr.; cochineal, 3 dr.; all in No. 40 powder); diluted alcohol, sufficient to make 32 fl. oz. Mix and percolate in the usual way to make 32 fl. oz. of tincture.

Next prepare as follows the *Elixir of Gentian, Taraxacum, and Phosphoric Acid.*—Concentrated tincture, 16 oz.; alcohol, 20 oz.; water, 48 oz.; simple syrup, 44 oz.; phosphoric acid 50 per cent., 3 oz. Mix alcohol, water, and tincture together; then add syrup, previously mixed with the phosphoric acid, and filter. Finally, to make the finished product, elixir of gentian, taraxacum and phosphoric acid; glycerin and sherry wine, of each equal parts. Mix. Allow to stand 48 hours. Then filter

Greaseless Creams. E. B. Curtis. (*Amer. Drugg.*, 1910, **57,** 103.) The following are modifications of previously published formulæ :—(I.)—Stearic acid, 180 gr. ; sodium carbonate, 48 gr. ; borax, 3·5 gr. ; glycerin, 6 dr. ; lilac oil, 8 minims ; alcohol, 1 dr. ; water, 8 oz. Put the acid, carbonate, borax, glycerin and water in a capsule on a water-bath, heat until effervescence ceases. Then add the perfume dissolved in the alcohol, and beat with an egg beater until cold. This gives a light, fluffy pearly white cream. (II.)—Stearic acid, 10 Gm. ; cacao butter, 1 Gm. ; sodium carbonate, 4 Gm. ; borax, 4 Gm. ; glycerin, 8 c.c. ; oil of bitter almond, 1 drop ; oil of rose, 5 drops ; alcohol, 6 c.c. ; water, 80 c.c. Heat the acid, carbonate, cacao butter, borax and glycerin on a water-bath until effervescence ceases, discontinue heat, and as mixture congeals add the alcohol, in which the oils have been dissolved, warm again, and, while cooling, beat vigorously. H_2O_2 may be added for its bleaching effect, also a trace of castor oil may be used to produce a pearly effect. A disadvantage of this type of cream is its proneness to fall or shrink on keeping. This may be overcome by the addition of a small amount of grease, such as cacao butter, almond oil or paraffin. Another substance used to overcome this fault is mucilage of tragacanth, the idea being to coat the particles, thus keeping them from contact with the air. If the cream is kept in jars, a coating of paraffin on top will prevent evaporation.

Guaiacol Cacodylate, Solubility of, in Water and Oil. L. Bourdet. (*Bull. Sci. Pharm.*, 1911, **18,** 351.) It has been noted that ampullæ, containing 5 : 100 aqueous solution of guaiacol cacodylate, after standing some time show a separation of reddish oily drops. Certain makes of these, however, do not show this separation. The so-called guaiacol cacodylate is not a true chemical compound : it is a mixture in equimolecular proportions. Consequently the 5 per cent. solutions should contain 2·633 per cent. of cacodylic acid and 2·366 per cent. of guaiacol. Of the latter figure 1·9 Gm. will dissolve in 100 parts of water, leaving about 0·46 to be suspended. As a minute bubble of air must be left in ampullæ, this guaiacol is slowly oxidized to form the red oil noted. It was found that those ampullæ which did not show this separation were deficient in strength, containing only 1·843 or 1·809 per cent. of cacodylic acid instead of 2·633 per cent. So apparent solubility has been obtained by diminishing the quantity of substance to be dis-

solved; although the preparation was sold as being 5 : 100. The use of oil as solvent was found to be impracticable, since the cacodylic acid is relatively insoluble in oils, 1 : 100 will not dissolve. It is to be noted that in current literature from 5 to 1 per cent. oily solutions of guaiacol cacodylate are stated to be obtainable; this is incorrect.

Horticultural Copper Wash for Parasitic Growths. Perrin. (*La Nature*, October 6, 1910; *J. Pharm. Chim. Epit.*, 1910, **2,** 30.) A solution containing crude copper oleate in suspension is advocated as a substitute for the familiar "Bouillie bordelaise" and similar copper washes employed as fungicides on plants. It is prepared by dissolving $CuSO_4$, 1 lb.; Na_2SO_4, 1 lb.; soft soap, 1 lb., in water, 10 gallons. This is said to be more effective than the older formulæ, and the presence of the copper soap assures the rapid destruction of the cells of the parasite. The wash also has much greater adhering properties. It remains longer on the leaves, and at the same time has greater penetration, so that it acts more effectively on the mycelial filaments beneath the epidermal surface of the leaves.

Huchard's Pills for Hæmoptysis. (*Merck's Report*, 1910, **23,** 183.) Ergotin, quinine sulphate, of each 30 grains. Powdered digitalis leaves, extract of hyoscyamus, of each 3 grains. Divide into 20 pills. One pill at intervals as required; from 5 to 10 thus taken per diem.

Inhalation for Acute Laryngitis. (*Nouv. Remèdes Formulary*, 1910, **27** [22].) Simple tincture of benzoin, 20 Gm.; tincture of eucalyptus, 10 Gm.; menthol, 1 Gm.; chloroform, 2 Gm.; alcohol, 70 Gm. A teaspoonful in a jug of boiling water for inhalation two or three times a day.

Kerosene in Pharmacy. W. H. White. (*Proc. Amer. Pharm. Assoc.*, 1910, **58,** 1129.) Kerosene has considerable use in the U.S.A. as a domestic remedy, and it has been given with good results as rectal injection for amœbic dysentery. Its chief value is, however, as a liniment for rheumatism. For this purpose the following liniment is useful: Camphor, 2; peppermint oil, 1; wintergreen oil, 1; clove oil, 4; cassia oil, 8; cottonseed oil, 16; cajuput oil, 16; turpentine oil, 8; kerosene, 144. Mix and filter.

Kolynos Tooth Paste. (*Pharm. Zeit.*, 1911, **56,** 253.) Medicinal soap in powder, 132 ; precipitated chalk, 100 ; absolute alcohol, 80 ; glycerin, 60 ; benzoic acid, 12 ; oil of eucalyptus, 8 ; oil of peppermint, 8 ; saccharin, 2 ; thymol, 1.

Liquor Santal. Co. c̄ Cubeb et Buchu. R. C. Cowley. (*Chem. and Drug.*, 1910, **77,** 164.) Sandalwood oil, 16 c.c. ; oil of cubebs, 8 c.c. ; oil of pimento, 0·5 c.c. ; oil of cassia, 0·5 c.c. ; balsam of copaiba, 16 c.c. ; olive oil, 20 c.c. ; alcohol, 64 c.c. ; caustic potash, 5·75 Gm. ; tincture of buchu, 48 c.c. ; conc. infusion of buchu (1 to 7), 48 c.c. ; distilled water, a sufficiency. Dissolve the potash in 5 c.c. of water in a flask, add the oils, the balsam of copaiba, and the alcohol. Heat on a water-bath for a few minutes, arranging so that the volatilized alcohol drops back into the flask. A suitable arrangement for the purpose when a condenser is not at hand is to place a funnel in the neck of the flask and a dish of cold water in the funnel. Test the solubility of the liquid in water, and when it mixes clear, which it will after a few minutes' heating, cool the liquid, add the remaining ingredients, and sufficient water to make 264 c.c. ; filter through paper. The product is perfectly miscible with water ; it contains all the oils ; and has the additional advantage of being quickly prepared. The time required need not be longer than half an hour. The formula might be improved by substituting tincture buchu or fluid extract entirely for the indefinite 1 to 7 concentrated infusion, which has nothing, except perhaps cheapness, to recommend it. Additional flavouring agents might also be added ; so might a proportion of glycerin, to make it more palatable ; and to prevent precipitation of extractive matter.

Liver of Sulphur, Fungicidal Action of. F. W. Forman. (*J. Agric. Sci.*, 1910, **3,** 400 ; *J.S.C.I.*, 1911, **30,** 150.) Experiments with *Botrytis cinerea* indicate that the sodium hydroxide present in some commercial samples of " liver of sulphur " is the most active fungicide of all the constituents. The use of soda instead of potash in the preparation of " liver of sulphur " therefore increases the effectiveness of the product and lessens its cost. Since the polysulphides in dilute aqueous solution undergo gradual hydrolytic dissociation, they are continually yielding free alkali, to which their toxic action on fungus spores and tissues is probably due. If the sulphur has any fungicidal properties at all, they are probably purely mechanical. It is suggested

that NaOH solutions, much weaker than the "liver of sulphur" solutions generally employed as horticultural fungicides, would be more effective.

Lubricant for Filing and Boring Holes in Glass. G. Denigès. (*Bull. de la Soc. de Pharm. de Bord.*, 1910, 421.) The following solution is preferred by the author to all others for the purpose of filing and boring holes in glass: 10 Gm. of camphor is dissolved in 100 c.c. of crystallizable benzene; to this liquid 30 Gm. of sweet almond oil, or olive oil, is added, and the whole thoroughly mixed. With this medium glass may be filed or bored very quickly, and it may be washed away easily and completely from the parts operated upon by means of benzene.

Obesity, External Local Applications for Reducing. Robin. (*Amer. Drug.*, 1911, **58,** 145.) In addition to general treatment, the application by friction, over the parts which are to be reduced, every night before retiring with the following ointment is recommended: Extract of nux vomica, gr. viiss; extract of bladderwrack, gr. xxx; potassium iodide, gr. xlv; iodine, gr. v; petrolatum, ʒi; perfume to taste; mix. After the ointment has been absorbed, wipe off carefully any that may remain on the skin, and cover the parts with a compress of lint soaked in the following liquid: Aluminum acetate, gr. xv; lead acetate, ʒiv; distilled water, ʒiii; mix. This should be covered in turn by oiled silk or gutta-percha tissue, followed by a layer of cotton. When the application is to be made to the abdomen the following is substituted for the ointment: Potassium iodide, ʒiiss; vinegar of squill, ʒvi.; mix. Apply on a compress of lint, and cover with oiled silk or gutta-percha tissue.

Oil Paintings, Photochemical Deterioration of. M. Toch. (*Proc. Seventh Int. Cong. Appl. Chem.*, London, 1909, Sect. 31–35; IX., *J.S.C.I.*, 1911, **30,** 224.) The deterioration of oil paintings is due to the action of white lead on the colouring matter contained in the linseed oil. Bleached linseed oil when mixed with ZnO and kept in the dark, also turns yellow. Similar experiments on mixtures of white lead and zinc white with the colouring matter of flax-seed, grass, and the fossil resins with and without linseed oil, all had the same result, viz., a darkening of the mixture. When gum dammar was mixed with the pigment, only slight decomposition was observed in presence of turpentine, and none in presence of naphtha and small quanti-

ties of benzene. When used for painting, a dammar as nearly colourless as possible should be selected. If linseed oil has to be used, the raw unbleached product should be chosen. Poppy-seed and walnut oils do not become yellow so rapidly as linseed oil, but they are slower in drying. Further experiments with linseed oil indicated that paintings which had become discoloured with age, could be permanently restored to their original brilliancy by exposure to sunlight, providing that they contained no asphaltum or bitumen.

Ozonized Ointments. (*Pharm. Zeit.*, **55,** 410.) According to the specification of a German patent, the addition of paraldehyde to a fatty basis enables the latter to absorb a definite volume of ozone when the mixture is submitted to a current of that gas. With this, ointments containing a prescribed quantity of ozone may be prepared.

Hydrogen Peroxide, Para-Acetyl Amidophenol as a Preservative for. M. Schlaugk. (*Apoth. Zeit.*, 1911, **26,** 106.) H_2O_2 solutions may be preserved by the addition of para-acetyl amidophenol. This addition is stated to increase the antiseptic properties of the peroxide, so that its employment is advocated for dental and cosmetic preparations containing the latter.

Perfumery, Modern Methods in. R. F. Fischer. (*Perfumery Record*, 1910, **1,** 162.) Vanillin may be considered to be the forerunner of the so-called synthetic perfumes, although its importance to perfumery is not so great as its influence on the manufacture of flavouring substances. Coumarin followed, produced synthetically by the action of acetic anhydride on salicylic aldehyde, although natural coumarin, derived from the leaves of *Liatris odoratissima*, has until recently been the main source of this perfume. Heliotropin, originally made from piperine, but now obtained by the oxidation of isosafrol and subsequent purification of the bisulphite compound, was the third important addition to these perfumes. Then terpineol was produced, of which no less than 14 isomers have been synthetized. This is now manufactured by the action of dilute acids on terpin hydrate. The qualities suitable for perfumery should not boil below 216°C. The lower fractions, known commercially as terpinolen or terpinol, are less fragrant. Terpineol has been the most important of all the synthetic compounds for the perfumer, being an ingredient in such odours as muguet,

syringa or lilac. Another useful product is amyl salicylate or orchidée. This product, which has not a very pleasant odour by itself, has furnished, nevertheless, the base for one of the most successful perfumes of late years, Piver's trèfle incarnat. It has been mixed and blended with various other ingredients and brought upon the market under several fancy names, mostly indicating its destination for trèfle perfumes. This ester imparts a peculiar characteristic sweetness to a basic compound, and is to-day one of the most indispensable products for the perfumer and soap-maker.

Among other much used artificial products now employed in perfumery the following are mentioned :—

Benzyl acetate, one of the important bases of the jasmine odour. Benzyl alcohol, a constituent of jasmine oil. Benzyl benzoate, a solvent for artificial musk. Cinnamic alcohol, of great importance for hyacinth combinations. Ethyl and methyl esters of cinnamic acid, useful in various perfume compounds, on account of their fine aromatic obour. Methyl benzoate or niobe oil, a valuable ingredient for soap compounds. Methyl-ester of anthranilic acid, a characteristic constituent for the production of orange blossom odours. Methyl-ester of methyl-anthranilic acid, the aromatic constituent to which mandarin oil owes its peculiar odour rendering it so intensely more aromatic than oil of orange. Nerolin or yara-yara and bromelia, the methyl respectively ethyl esters of beta-naphthol, are cheap orange flower substitutes, particularly for soap compounds. Phenyl-ethyl acetate, of great importance for hyacinth compounds. Phenylethyl alcohol, an important constituent of the rose odour. In the group of aldehydes we find : Anisic aldehyde or aubèpine, the well-known hawthorn odour. Benzaldehyde and cinnamic aldehyde, both very valuable as bases for soap compounds. Phenylacetaldehyde, one of the first bases used in the manufacture of hyacinth compounds. The higher aldehydes, as octyl-aldehyde, nonylaldehyde, decylaldehyde, which have been found to be present in quite a number of flower oils, such as cassie flower and rose oils. The phenol group furnishes : Eugenol and iso-eugenol, which in turn helped to create the carnation pink odours. Safrol and iso-safrol, the former a valuable base for soap compounds, the latter of great importance as initial product for the manufacture of heliotropin.

Petrox Preparations. G. M. Beringer and G. M. Berin

ger, jun. (*Amer. Drugg.*, 1911, **58**, 175, 215.) The following formulæ are in some instances new, in others are modifications of those already occurring in the N.F. or the B.P.C. In all cases the liquid as well as the solid ingredients are given by weight. *Petroxolinum liquidum.*—Liquid petrolatum, 50 Gm.; oleic acid, 28 Gm.; oil of lavender, 2 Gm.; stronger solution of ammonia, 5 Gm.; alcohol, 15 Gm. Mix the liquid petrolatum, oleic acid and oil of lavender in a flask, then add the alcohol and finally the ammonia, and agitate thoroughly until clear, warming the mixture slightly, on a water-bath if necessary. Slight warming may be required in cold weather, to promote the saponification. A yellowish brown liquid, soluble in ether, chloroform, benzin and acetone; produces an emulsion on agitation with twice its volume of water. This formula does not vary very greatly from that in the present National Formulary formula. The product forms a permanent emulsion with water. The formula of the B.P.C. yields a preparation that will not even form a good temporary emulsion with water, but separates almost immediately. *Petroxolinum chloroformi camphoratum.*—Chloroform, 25 Gm.; camphor, 25 Gm.; liquid petroxolin, 50 Gm. Dissolve the camphor in the chloroform, then add the liquid petroxolin. *Petroxolinum cadini.*—Oil of cade, 25 Gm.; liquid petroxolin, 75 Gm. Mix them. *Petroxolinum cresoti.*—Creosote, 20 Gm.; oleic acid, 5 Gm.; liquid petroxolin, 75 Gm. Mix them.

The B.P. Codex directs the creosote formula to be only 5 per cent. creosote, yet calls for 20 per cent. of guaiacol in the formula with the latter medication, but as the manufacturers list both as 20 per cent. formulas, it was deemed advisable to make these formulae correspond with the usage of American practice. If 5 per cent., however, be adopted, then the addition of oleic acid will not be required. The creosote, guaiacol and eucalyptol petroxolins all darken considerably on keeping, and if that is deemed to be an objection they can readily be prepared as wanted. The darkening is probably due to traces of iron in the oleic acid and is not serious, as it cannot affect the medicinal action. *Petroxolinum eucalyptolis.*—Eucalyptol, 20 Gm.; liquid petroxolin, 80 Gm. Mix. *Petroxolinum guaiacolis.*—Guaiacol, 20 Gm.; oleic acid, 5 Gm.; liquid petroxolin, 75 Gm. Mix. *Petroxolinum hydrargyri.*—Mercury, 30 Gm.; hydrous wool fat, 15 Gm.; solid petroxolin, 55 Gm. Triturate the mercury with the hydrous wool fat until it is killed; then add the solid

petroxolin and mix thoroughly. The percentage of mercury has been reduced to 30 per cent., which in a base so readily absorbed is believed to be ample to produce salivation. *Petroxolinum ichthyolis.*—Ichthyol, 10 Gm.; oleic acid, 5 Gm.; liquid petroxolin, 85 Gm. Mix. *Petroxolinum iodi.*—Iodine, 10 Gm.; oleic acid, 40 Gm.; alcohol, 20 Gm.; liquid petrolatum, 23 Gm.; oil of lavender flowers, 2 Gm.; stronger ammonia solution, 5 Gm. Reduce the iodine to coarse powder by triturating in a glass mortar and transfer it to a suitable flask, add the alcohol and then the oleic acid, and agitate the contents of the flask until the iodine is dissolved; now add the oil of lavender and the liquid petrolatum and mix the liquids, and finally add the stronger ammonia, shaking the mixture until a clear solution results. It was found impossible to prepare a 10 per cent. iodine petrox by simple solution in the liquid petroxolin. By improper mixing there results another difficulty, namely, the separation out of the iodine as a salt. *Petroxolinum iodi dilutum.*—Iodine petroxolin, 50 Gm.; liquid petroxolin, 50 Gm. Mix them. Alternative formula: Iodine in coarse powder, 5 Gm.; liquid petroxolin, 95 Gm. Dissolve the iodine by agitation with the liquid petroxolin in a stoppered bottle. *Petroxolinum iodoformi.*—Iodoform, 3 Gm.; acetone, 20 Gm.; oleic acid, 10 Gm.; eucalyptol, 3 Gm.; liquid petroxolin, 64 Gm. Dissolve the iodoform in the acetone, add the eucalyptol, oleic acid and the liquid petroxolin, and mix the ingredients. *Petroxolinum mentholis.*—Menthol, 5 Gm.; liquid petroxolin, 95 Gm. Dissolve the menthol in the liquid petroxolin by agitation. *Petroxolinum methylis salicylatis.*—Methyl salicylate, 20 Gm.; liquid petroxolin, 80 Gm. Mix. *Petroxolinum naphtholis.*—Betanaphthol, 10 Gm.; liquid petroxolin, 90 Gm. Dissolve the betanaphthol in the liquid petroxolin by agitation. *Petroxolinum phenolis.*—Phenol, 5 Gm.; liquid petroxolin, 95 Gm. Dissolve the phenol in the liquid petroxolin by agitation in a stoppered bottle. *Petroxolinum picis.*—Oil of tar, 25 Gm.; liquid petroxolin, 75 Gm. Mix them. Oil of tar makes a clear solution, and for this use it is certainly to be preferred to tar. Hence the formulæ of the foreign formularies which direct tar have been modified. *Petroxolinum salicylatum.*—Salicylic acid, 10 Gm.; oleic acid, 5 Gm.; liquid petroxolin, 85 Gm. Dissolve the salicylic acid in the oleic acid and liquid petroxolin. *Petroxolinum phenolis camphoratum.*—Phenol, 12·5 Gm.; camphor, in powder, 37·5

Gm.; liquid petroxolin, 30 Gm. Mix the camphor and phenol, and when the mixture has liquefied add the liquid petroxolin and mix thoroughly. *Petroxolinum sulphuris.*—Sublimed sulphur, 3 Gm.; linseed oil, 37 Gm.; oleic acid, 30 Gm.; liquid petroxolin, a sufficient quantity to make 100 Gm. Heat the sublimed sulphur and linseed oil in a flask, on a sand-bath, until the sulphur is dissolved, then allow to cool and add the oleic acid and sufficient liquid petroxolin to make the product weigh 100 Gm., warming the mixture slightly if necessary to obtain a clear liquid. A dark brown thick oleaginous liquid possessing a very foul odour; undiluted it is unsuitable for human use, but is used in the diluted form. *Petroxolinum sulphuris compositum.*—Sulphur petroxolin, 10 Gm.; oil of cade, 10 Gm.; thymol, 0·3 Gm.; eucalyptol, 3 Gm.; oil of turpentine, 30 Gm.; liquid petroxolin, a sufficient quantity to make 100 Gm. Mix the thymol and eucalyptol, add the oils and then the sulphur petroxolin, and finally sufficient liquid petroxolin to make the product weigh 100 Gm. *Petroxolinum terebinthinæ venetiæ.*—Venice turpentine, 20 Gm.; liquid petroxolin, 80 Gm. Mix. *Petroxolinum spissum.*—Paraffin, 37 Gm.; liquid petrolatum, 20 Gm.; oleic acid, 30 Gm.; oil of lavender flowers, 3 Gm.; alcohol, 5 Gm.; stronger ammonia solution, 5 Gm. Melt the paraffin with the liquid petrolatum on a water-bath, add the oleic acid, and transfer the mixture at once to a warm mortar; immediately add the oil of lavender and the mixed alcohol and stronger ammonia, and stir continuously until cool. This yields a smooth pale yellow ointment, and if the above directions are carefully followed the resulting product is smooth and creamy, very suitable for an ointment base. It is essential that the mortar be warmed so as to ensure a gradual cooling, and that the stirring be continuous, otherwise the mass will be uneven and granular.

Phosphotungstic Acid as a Micro-Fixative. (*Merck's Report*, 1910, **23**, 91.) B. Rawitz finds the following solution useful in histological work. Phosphotungstic acid solution, 1 : 10, 40 c.c., is mixed with alcohol 95 per cent., 50 c.c., and glacial acetic acid, 10 c.c., is added. The first two are kept ready mixed and the acetic acid is added immediately before the fixer is required. The objects are macerated in this for 24 hours, then transferred

to alcohol 70 per cent. After hardening off in successive changes of alcohol, they are transferred to alcohol 93–94 per cent.

Pills for Obesity ; Compound Pills of Fucus vesiculosus. (*Pharm. Assoc., Copenhangen* ; *Apoth. Zeit.*, 1910, **25,** 724.) Dry extract of *Fucus vesiculosus*, 6 Gm. ; dried extract of burdock, 5 Gm. ; dried extract of cascara, 2 Gm. ; extract of aloes, 1 Gm. ; extract of rhubarb, 1 Gm. ; powdered Irish moss, 1 Gm. ; alcohol, 70 per cent., q.s. to mass. Divide into 100 pills. Silver. One pill to be taken night and morning, at first ; then two pills at each dose.

Pomade for Baldness. (*Formulary, Nouveaux Remèdes*, 1911 [3].) Pilocarpine hydrochloride, 2 ; quinine hydrochloride, 4 ; precipitated sulphur, 10 ; balsam of Peru, 20 ; beef marrow, q.s. to make 100. Mix. Apply after washing the head with soap and water.

Scharff's Solution. (*Muench. Med. Woch.*, 1911, 226 ; *Pharm. Zentralh.*, 1911, **52,** 126.) Morphine, 0·10 Gm. ; atropine sulphate, 10 *milligrammes* ; solution of antipyrine 1 : 10, 100 Gm.

Sea Water, Artificial. E. J. Allen and E. W. Nelson. (*Quart. Journ. Microscop. Sci.*, 1910, **55,** 394.) In the course of a communication on the artificial culture of marine plankton organisms, the following formula for artificial sea water is given. The distinctive character of this is the slight excess of alkalinity, which is a property of natural sea water. NaCl. 26·75 Gm. ; KCl, 0·75 Gm. ; $MgCl_2$, 3·42 Gm. ; $CaCl_2$, 0·51 Gm. ; $MgSO_4$, 2·1 Gm. ; N/2 Na_2CO_3 solution, 2·4 c.c. Distilled water to make 1,000 c.c.

Shampoo Powder for Dry Use. (*Chem. and Drugg.*, 1911, **78,** 54.) Powdered orris, 6 oz. ; fullers' earth, 7 oz. ; arrowroot starch, ½ oz. ; oil of lavender, 1 dr. ; alcohol, 2 oz. The oil of lavender is dissolved in the spirit and sprayed on to the mixed powders. The powder is employed by sprinkling on the hair overnight, removing it in the morning by vigorous brushing.

Skin Cream, Non-Fatty. (*Pharm. Zeit.*, 1910, **55,** 619.) Dissolve agar-agar, 3, in water, boiling, 150, and strain. Heat water 100, add stearic acid 15, and sodium carbonate 10 ; and when reaction is complete, theobroma oil 15, 90 per cent.

alcohol 10, and the agar jelly, mixing throughly with a beater. When cool beat again until a smooth foam is obtained. When cold, any desired perfume may be added.

Skin Pastes. P. Françis. (*J. Pharm. d'Anvers; Chem. and Drugg.*, 1911, **78**, 86.) *Sulphur Paste* (10 *per cent.*).—Precipitated sulphur, 4 Gm.; zinc oxide, 6 Gm.; ceyssatite,[1] 2 Gm.; simple ointment, 28 Gm. *Thiol Paste.*—Liquid thiol, 4 Gm.; zinc oxide, prepared chalk, of each 10 Gm.; eucerin, 16 Gm. May be employed in place of eucerin lanoline, 14 Gm., soft paraffin, 2 Gm. *Zinc Oxide Paste.*—1 (Soft): Medicinal oil, lime-water, zinc oxide, prepared chalk, of each 25 Gm.; lanoline, 5 Gm. 2: Zinc oxide, powdered starch, soft paraffin, lanoline, of each 25 Gm. *Ceyssatite Paste.*—1 (Soft): Medicinal oil, lime-water, of each, 10 Gm.; ceyssatite, 8 Gm.; lanoline, 5 Gm. 2: Ceyssatite, 2 Gm.; zinc oxide, 10 Gm.; simple ointment, 28 Gm. *Skin-colour Paste.*—Lycopodium (skin-colour), 5 Gm.; zinc oxide, 2 Gm.; eucerin, 13 Gm. *Cade Oil Paste.*—Cade oil, kaolin, equal parts. *Eucerin Paste.*—Zinc oxide, starch powder, of each 10 Gm.; eucerin, 20 Gm. *Glycerole of Starch Paste.*—Zinc oxide, 15 Gm.; glycerole of starch, 35 Gm. *Dextrin Paste.*—Powdered dextrin, glycerin, distilled water, of each equal parts. Mix and heat on a water-bath for half an hour, replacing evaporated water. *Acetic Acid Paste.*—Glacial acetic acid, 5 Gm.; ceyssatite, 10 Gm. Mix in a mortar and add—lanoline, 20 Gm.; soft paraffin, 15 Gm. *Cosmetic Paste* (Fard Blanc.).—Bismuth carbonate, 10 Gm. French chalk (finely powdered), 6 Gm.; lanoline, 3 Gm.; spermaceti, 2 Gm.; glycerin, 5 Gm. *Exfoliating Pastes.*—I (Unna's): Resorcin, 40 Gm.; ceyssatite, 2 Gm.; zinc oxide, 10 Gm.; simple ointment, 28 Gm. II (Besnier's.): Betanaphthol, salicylic acid, resorcin, of each 5 Gm.; precipitated sulphur, potash soap, powdered starch, soft paraffin, of each, 25 Gm. III (Lassar's): Betanaphthol, 10 Gm.; potash soap, 25 Gm.; precipitated sulphur, 50 Gm.; soft paraffin, 25 Gm. *Depilatory Pastes.*—I (Goudet's): Quicklime, 10 Gm.; ammonium sulphydrate, 2 Gm.; powdered starch, 10 Gm.; distilled water, sufficient to make a paste. II (Anderson's): Barium sulphide, 6 Gm.; zinc oxide, 24 Gm.; distilled water, sufficient to make a paste. III (Duhring's): Sodium sulphide,

[1] Ceyssatite is an infusorial earth, for which the best brands of kieselguhr may be substituted.

8 Gm.; prepared chalk, 24 Gm.; distilled water, sufficient to make a paste.

Soapnut Powder as an Emulsifier for Horticultural Sprays and Washes. G. Gastine. (*Comptes rend.*, 1911, **152,** 532.) Saponins from any source are far preferable to soap for emulsifying the various insecticidal oils and poisons used in agricultural sprays. Not only is a better, more stable emulsion obtained, with the active ingredients more minutely divided, but the saponins are absolutely inert, and have no deleterious action on the most delicate vegetable tissues, and also more thoroughly saturate the insects, and evenly wet their skins. Of all the saponin-yielding material, the fruit of *Sapindus utilis*, the soap nut, largely cultivated in Algeria, is the best for the purpose. It is so rich in water-soluble saponin, containing over 50 per cent., that the powdered pericarps may be used direct, without any previous extraction. A typical emulsion is the following which is stated to be equally effective against aphides and other insect pests, and cryptogamic blights. Heavy tar oil is mixed with sufficient kerosene to reduce its sp. gr. to about 1·000. Of this mixture 200 Gm. and neutral copper acetate, 100 Gm., are emulsified in water, 10 litres, by means of powdered soapnut, 20 Gm. The emulsion is then used as a spray or wash. Other insecticides may be similarly suspended. It is stated that the above quantity of soapnut powder will emulsify 700 Gm. of heavy tar oil, with 10 litres of water, so that the emulsion passes through filter paper; and, under the microscope, resembles milk in appearance.

Soap, Surgeons, Gritty. J. K. Thum. (*Amer. J. Pharm.*, 1911, **83,** 111.) Ordinary pumice soap, contains a large excess of free alkali, which renders it unsuitable for frequent use by surgeons as a cleansing agent for the hands, before sterilizing. The following formula gives a soap which is free from this defect. Cottonseed oil, 500 c.c.; stearic acid, 500 Gm.; sodium hydroxide, 150 Gm.; alcohol 95 per cent., 150 c.c.; solution sodium chloride 1 : 5, q.s.; distilled water, q.s.; powdered pumice, 300 Gm. Melt the stearic acid in the cottonseed oil, with heat. Then add the NaOH, dissolved in a litre of distilled water, and heat for 15 minutes with constant stirring. Next add the alcohol and stir until saponification is completed, when the mixture will become homogeneous. Then add one litre of the NaCl and stir vigorously. Allow to stand until the soap has set;

then drain out the alkaline liquid. Wash the soap two or three times with distilled water, melt, and incorporate the powdered pumice. While still hot, pour into suitable moulds. In twenty-four hours the soap will be sufficiently hard for use.

Species for Alpine Herbal Tea. (*Copenhagen Formulary; Apoth. Zeit.*, 1911, **26,** 294.) Red poppy petals, 1; verbascum flowers, 2; senna, 12; coltsfoot leaves, 6; woodruff herb, 4; milfoil herb, 2; thyme, 1; guaiacum chips, 2; sassafras chips, 2; marsh mallow root, 6; licorice root, 2. All comminuted.

Steam Bath. J. Wood. (*Pharm. J.*, 1911 [4], **32,** 331.) The construction of an efficient steam-bath is described and figured.

Strychnine Salts, Solubilities of. D. B. Dott. (*Pharm. J.*, 1910 [4], **31,** 795.) *Strychnine nitrate.*—At the ordinary temperature, near 15°C., strychnine nitrate has the following solubilities: In water, 1 : 70·5 or 1 : 71. In cold alcohol 90 per cent. 1 : 130 by volume or 1 : 108·4 by weight. In boiling alcohol 90 per cent., 1 : 29 by volume, or 1 : 24 by weight. Five pharmacopœais give the solubility in cold and hot alcohol as 1 : 70 and 1 : 5 respectively. *Strychnine acid tartrate* in water, 1 : 200. *Strychnine acid oxulate,* in water, 1 : 82.

Suggested New Formulæ and Modifications for N.F. (*Pharm. J.* 1911 [4], **32,** 298.) Several formulæ are proposed for addition or change in connexion with the U. S. National Formulary, as follows:—

Essentia Pepsini.—Pepsin, 22·5 Gm.; rennin, 16·5 Gm.; lactic acid, 2 c.c.; tincture of sweet orange peel, 15 c.c.; oil of nutmeg, 0·05 c.c.; vanillin, 0·05 Gm.; glycerin, 150 c.c.; alcohol, 200 c.c.; purified talc, 15 Gm.; distilled water, a sufficient quantity to make 1,000 c.c. Dissolve the pepsin and rennin in 500 c.c. distilled water, to which the lactic acid has been added, and then add the glycerin and the alcohol, to which has been added the tincture of sweet orange peel, the oil of nutmeg, and the vanillin. Shake after each addition, and finally add sufficient distilled water to make 1,000 c.c. of product. Add purified talc, mix and filter.

O. E. Bruder points out that no formula for a liquid preparation of pepsin is complete without a sufficient quantity of HCl. C. F. Nixon thinks that in pepsin preparations too much flavouring material, has been used, and submits a formula having

the following proportions :—Pepsin, 22 Gm. ; rennin, 4 Gm. ; hydrochloric acid, 1 c.c. ; oil of orange, 1 c.c. ; glycerin, 200 c.c. ; alcohol, 200 c.c. ; purified talc, 15 Gm. ; distilled water, a sufficient quantity to make 1,000 c.c.

F. M. Apple suggests adding a small amount of oil of cardamom. O. Raubenheimer prefers rennin having a higher standard than that usually employed, and insists that it should be free from NaCl. He also prefers a mixture of 10 c.c. of tincture of sweet orange and 10 c.c. of tincture of cardamom as a flavour. S. L. Hilton recommends the use of kieselguhr in place of talc. H. A. B. Dunning thinks the flavour insufficient to hide the animal odour of the pepsin, and recommends the addition of oil of cloves. He also suggests that the pepsin be triturated with glycerin before adding any of the water. W. S. Richardson states that solutions of pepsin and rennin could be filtered through powdered wood charcoal to remove the animal odour without materially influencing the activity of the ferments, and the resulting preparation would be much more agreeable. *Elixir pepsini compositus.*—Pepsin (soluble scale or granular), 15 Gm. ; lactic acid, 1 c.c. ; hydrochloric acid, 2 c.c. ; glycerin, 250 c.c. ; alcohol, 200 c.c. ; oil of orange, 2 c.c. ; cudbear, 1 Gm. : distilled water, a sufficient quantity to make 1,000 c.c. Mix the acids with the glycerin and 500 c.c. of distilled water, add the pepsin, and macerate with occasional agitation until solution is effected. Then add gradually the alcohol in which the oil of orange has been dissolved, agitating after each addition. Now add the cudbear and sufficient distilled water to make the preparation measure 1,000 c.c. Macerate for six hours, with occasional shaking, and then filter. G. M. Beringer directs attention to his formula, published two years ago (*Y.B.*, **1909,** 163). C. F. Nixon presents a formula having the following proportions :—*Elixir pepsini* (*rubrum* ?).—Pepsin, 15 Gm. ; hydrochloric acid, 1 c.c. ; glycerin, 200 c.c. ; alcohol, 200 c.c. ; oil of orange, 0·50 c.c. ; oil of lemon, 0·50 c.c. ; sugar, 150 Gm. ; cudbear, 1 Gm. ; purified talc, 15 Gm. ; distilled water, a sufficient quantity to make 1,000 c.c. *Linimentum terebinthinæ Aceticum* (Linimentum album. Stoke's liniment. St. John Long's liniment.)—Oil of turpentine, 200 c.c. ; oil of lemon, 8 c.c. ; acetic acid, 40 c.c. ; rose water, 170 c.c. ; fresh eggs, a sufficient quantity. Triturate the whole contents of one egg and the yolk of another with the oil of turpintine and the oil of lemon in a mortar until they are thoroughly mixed. Then

incorporate the acetic acid and rose water. Shake the mixture, whenever it is to be dispensed. *Liquor alumini acetatis.*—Aluminum sulphate (U.S.P.), 300 Gm.; acetic acid (U.S.P.), 300 Gm.; calcium carbonate, 130 Gm.; water, 1,000 c.c. Dissolve the aluminium sulphate in 800 c.c. of cold water, and filter, gradually add the calcium carbonate previously mixed with 200 c.c. of water, then, in divided portions, slowly add the acetic acid. Allow the resulting mixture to stand for twenty-four hours, at ordinary temperature, with occasional stirring. Finally decant the supernatant clear solution. *Liquor antisepticus alkalinus* ("Alkaline Antiseptic").—Potassium bicarbonate, 32 Gm.; sodium benzoate, 8 Gm.; sodium borate, 32 Gm.; thymol, 0·2 Gm.; eucalyptol, 0·2 Gm.; oil of peppermint, 0·2 Gm.; oil of betula, 0·4 Gm.; cudbear, 2 Gm.; alcohol, 60 c.c.; glycerin, 250 c.c.; purified talc, 10 Gm.; water, a sufficient quantity to make 1,000 c.c. Dissolve the salts in 600 c.c. of water and the thymol, eucalyptol, and oils in the alcohol. Mix the alcoholic solution with the glycerin, add the solution of the salts and enough water to make 1,000 c.c. Add the cudbear and the purified talc, and shake occasionally during three days, then filter, returning the first portions until the filtrate passes brilliantly clear. C. F. Nixon recommends the following:—Potassium bicarbonate, 32 Gm.; sodium benzoate, 8 Gm.; sodium borate, 32 Gm.; thymol, 0·20 Gm.; eucalyptol, 0·20 Gm.; oil of peppermint, 0·20 Gm.; oil of betula, 0·40 Gm.; alcohol, 60 c.c.; glycerin, 125 c.c.; cudbear, 2 Gm.; purified talc, 15 Gm.; tincture of cardamom, U.S.P., 10 c.c.; water, a sufficient quantity to make 1,000 c.c. *Magma magnesiæ* (Milk of Magnesia).—Magnesium sulphate, 250 Gm.; sodium hydroxide, 81 Gm.; water, a sufficient quantity to make 1,000 c.c. Dissolve the NaOH and the $MgSO_4$, each in 1,000 c.c. of water, and mix by pouring the former in a thin stream into the latter with constant stirring. Dilute to 3,000 c.c., allow the precipitate to subside and decant the clear fluid. Wash the magma three times with distilled water, then dilute to 4,000 c.c., and allow to settle to 1,000 c.c. O. Raubenheimer thinks that the amount of $MgSO_4$ can be reduced to 240 Gm. (the exact quantity needed is 224 Gm.) and there is less excess to wash out. The two solutions are best mixed cold. J. K. Thum suggests the following procedure:—Dissolve the $MgSO_4$ and the NaOH each in 500 c.c. of water, and mix by pouring the latter slowly, in a thin stream, into the

former, with constant stirring. Then dilute to 4,000 c.c., allow the magma to subside, and decant the clear fluid. Wash three times with water or until the washings are free from saline taste. Finally, dilute again to 4,000 c.c., and allow the magma to subside to 1,000 c.c. *Syrupus eriodictyi aromaticus* (Aromatic Syrup of Yerba Santa. Syrupus Corrigens).—Fluid extract of eriodictyon (U.S.P.), 32 c.c.; solution of potassium hydroxide (U.S.P.), 25 c.c.; compound tincture of cardamom (U.S.P.), 65 c.c.; oil of sassafras, 0·5 c.c.; oil of lemon, 0·5 c.c.; oil of cloves, 1 c.c.; alcohol, 32 c.c.; water, a sufficient quantity to make 1,000 c.c. Dissolve the oils in the alcohol and add the fluid extract and the tincture. Then add the solution of potassium hydroxide and 325 c.c. of water, shake the mixture thoroughly and filter. If the filtrate is not perfectly clear, add 5 Gm. magnesium carbonate, shake thoroughly and pass through filter until clear, finally pour enough water through the filter to obtain 500 c.c. of filtrate. Pour this upon the sugar contained in a bottle, and dissolve it by placing the bottle in hot water, frequently agitating. Lastly cool the product and add enough water, passed through the filter previously used, to make 1,000 c.c. John K. Thum and H. A. B. Dunning suggest adding $MgCO_3$ to the formula, so as to ensure more uniform results.

Tar Bath. M. Taeger. (*Bull. des Sci. Pharmacolog.*, 1911, 34). Mix 150 Gm. of oil of birch tar with 90 Gm. of a 15 per cent. solution of caustic potash, and then add half a litre of methylated spirit. Pour half of this liquid slowly into the bath, and mix thoroughly. The bath liquid then has the appearance of *café au lait*. For a foot-bath or hand-basin, use two tablespoonfuls of the tar solution.

Terpineol as a Clearing Agent for Microscopical Work. P. Mayer. (*Zeits. Wissenschaftl. Mikroskop.*, **26,** 523; *Schimmels' Report*, Oct., **1910,** 153.) Terpineol is recommended as a substitute for clove oil for all microscopic work. It has the advantage of remaining colourless; its odour is faint. It mixes perfectly with 90 per cent. alcohol, so that sections may be transferred direct from that reagent on to terpineol. It is misciable with benzol, xylol and other solvents. It is cheaper than clove oil. The refractive index is lower. Being free from acid reaction, carmine stains are not affected, and alum hæmatoxyllin stains do not easily fade. Collodion, however, is insoluble in

it. [We have found phenol, rendered liquid by the addition of 10 per cent. of alcohol, to be an excellent general clearing agent for general use specially for preparations to be permanently mounted in Canada balsam.—Ed. *Y.B.*]

Tobacco Leaves sterilized by Alcohol. A. Verda. (*Schweiz. Woch. Chem. Pharm.*, 1911, **49,** 108.) The fresh leaves were sterilized with the vapour of alcohol 80 per cent. by the Perrot-Goris method, then dried. They have kept their green colour perfectly for five months; and an infusion of them gives marked precipitate with KI + I reagent. The same leaves dried at once and kept, are yellowish green, and give only a slight turbidity. It is suggested that by inoculating the sterilized leaves with the proper ferments and "curing" them a high grade cigar tobacco, similar to the best Havana, could be obtained.

Triple Staining, a New Method for. V. Bonney. (*Merck's Report*, 1910, **23,** 261.) The following method of triple staining can be carried out in a few minutes. The three stains used are methyl violet, pyronin, and orange G. Solution I is prepared by dissolving with the aid of heat 25 grammes of methyl violet and 1 gramme of pyronin in 74 grammes of water, and filtering. Solution II is prepared by adding to 100 grammes of acetone drop by drop a filtered 2 per cent. aqueous solution of orange G until on vigorous stirring a precipitate is formed which redissolves on the further addition, drop by drop, of orange solution. This "orange acetone solution" is filtered. Its efficacy is not affected if crystals separate out from it later. The tissue is fixed in a solution of 1 part of glacial acetic acid and 2 parts of absolute alcohol—it is stained for two minutes in Solution I, rapidly washed with water—the slide is covered with Solution II, thereby producing a dark staining. It is then rapidly washed with water and repeatedly stained with orange acetone until no further colour appears—it is rapidly washed with acetone, placed in xylol, and mounted in balsam. These operations should not take more than 5 minutes.

Wrinkle Remover. (*Amer. Drugg*, 1911, **58,** 74.) Aluminum sulphate, 1 drachm; milk of almonds, 1½ fl. oz.; rose water, 6 fl. oz.; mix. Apply to the wrinkles morning and evening as a lotion.

RESEARCH LIST, 1911

THE following subjects are suggested for investigation, and the Executive Committee hopes that the members of the B.P.C. will undertake to work on one or more of these questions. It will be noted that several subjects have already been appropriated. In order to avoid duplication the Honorary Secretaries trust that members will communicate to them their intention of working at any of the subjects below; they also wish to direct attention to the fact that a special fund exists to defray expenses connected with research work. The Executive Committee will be glad to receive applications from members for grants from this fund.

1. *Aloin.*—A research is needed on the proportion of aloin and non-resinous constituents in the different varieties of aloes.

2. *Calabar Bean.*—A research is needed with the object of ascertaining the relative proportion of the different bases present in this drug.

3. *Cold Storage.*—The value of cold storage for drugs, herbs, and medicinal plants requires investigation.

4. *Hops.*—How can the bitter principle best be isolated and quantitatively determined?

5. *Male Fern.*—The chemistry and pharmacy of this drug both require investigation.

6. Rubber when frozen becomes hard and brittle. Could advantage be taken of this property of bodies for powdering drugs which readily undergo change on drying by heat?

7. *Strophanthus.*—An examination of the published methods of separating the different active principles obtained from the official seeds is needed with a view of recommending a standard process. (See *Year-Book*, **1898,** 54, 162; **1899,** 59; **1901,** 167; also *Pharm. Journal* [4], **6,** 385, 506.) The seeds in commerce are frequently mixed. Further information is desirable as to the active principles they severally contain.

8. *Tannin.*—A ready and tolerably accurate method for the determination of the tannin in various astringent drugs is required.

9. *Veratrine.*—Should a pure veratrine be included in the British Pharmacopœia rather than the mixture of alkaloids now official? If so, suggest a process for its purification.

10. *Zinc.*—To what extent is zinc found in the ash of drugs?

11. *Chemical investigation* of the following drugs is required :—*Cereus grandiflorus, Cassia fistula, Serenoa serrulata* (saw palmetto), *Arnica montana, Monsonia ovata, Monsonia biflora, Thuja occidentalis, Ranunculus ficaria, Tanacetum vulgare, Senecio Jacoboea* and *Achillea millefolium.*

12. The *Chemistry* of the following drugs requires extension :—*Aletris farinosa, Cascara Sagrada, Damiana, Ergot, Lobelia, Rhubarb, Senega, Senna.*

13. *Calx sulphurata.*—An investigation on the processes of manufacture, and purity of commercial samples is needed. (Already undertaken.)

14. *Esters.*—Examination of commercial esters such as ethyl acetate, ethyl butyrate, and amyl acetate would be useful.

15. *Indicators.*—Can some of the artificial colours which are only affected by mineral acids be used to determine the strength of preparations such as Liquor Plumbi Subacetatis?

16. *Solvents.*—Experiments are needed with a view to extending the use of solvents such as acetone, carbon tetrachloride, petroleum ether, etc., in pharmacy.

17. *Uric Acid.*—A comparison of the processes for the estimation of uric acid would be useful.

18. *Cannabis indica.*—Required standard strengths for the official preparations of this drug and processes for their determination, also the difference in yield of resin, cannabin, and cannabinol between the Guaza of Bombay, the Ganja of Calcutta, and other commercial varieties of cannabis. African Guaza is now coming into the market—a comparison of its properties with those of Cannabis indica would be of value.

19. *Colocynth.*—What is the effect of heat on the colocynth in making the compound extract?

20. *Ergot.*—A re-investigation of the pharmacy of this drug in the light of recent chemical work is required, and a method of determining the activity of the galenical preparations.

21. *Ferments.*—The action of ferments in inducing change in galenical preparations should be studied.

22. *Formaldehyde.*—The examination of commercial samples is required.

23. *Formulae.*—Improved formulae are required for the administration of nauseous drugs.

24. *Gum Resins.*—The value of the saponification numbers in determining the identity and purity of the resin of gum resins.

25. *Japanese Chillies* and *Japanese Ginger.*—Determination of the botanical source and comparison of the structure with that of the official drug is required. (Already undertaken.)

26. *Morphine.*—Can the process described in the *Year-Book of Pharmacy*, **1907,** p. 107, for the determination of morphine be applied to opium and its preparations ?

27. *Oil of Soya Bean* has become an important article of commerce. Can it be utilized in pharmacy ?

28. *Pills.*—A systematic investigation is required of the times necessary for the solution or disintegration of pills prepared with different excipients and kept for various periods of time.

29. *Quillaia Bark.*—Experiments to determine the best solvent for exhausting this bark for the purpose of making emulsifying agents, and a comparison of the genuine bark with the thin bark at present in commerce.

30. *Concentrated Tinctures.*—An examination of commercial samples is required.

31. *Calcium Lactate.*—Investigation required as to the effect of age upon the solubility, and the variation of commercial samples.

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

FORTY-EIGHTH ANNUAL MEETING

IN

PORTSMOUTH.

1911

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THE SITTINGS OF THE CONFERENCE WERE HELD IN THE

MUNICIPAL COLLEGE, PORTSMOUTH,

ON TUESDAY AND WEDNESDAY, JULY 25 AND 26, 1911.

TUESDAY, JULY 25.

The CONFERENCE met at 9.30 a.m., adjourning at 1.30 p.m.

Order of Business.

Address of Welcome by F. G. FOSTER, Esq., *Chairman of the Higher Education Commitee.*
Presidential Address.
Report of Executive Committee.
Financial Statement.
Reading of Science Papers and Discussions thereon.

SCIENCE SECTION.

PAPERS.

1. *Further Notes on Podophyllum Emodi*, by J. C. UMNEY, F.C.S.
2. *The Supposed Loss of Morphine in the Preparation of Tincture of Opium*, by ROBERT WRIGHT, Ph.C., F.C.S., and E. H. FARR, Ph.C., F.C.S.
3. *Extract of Indian Hemp*, by HAROLD DEANE, B.Sc., F.I.C.
4. *Note on Spirit of Sal Volatile*, by E. W. POLLARD, B.Sc., Ph.C.
5. *A Suggested Standard for Th yroideum Siccum*, by R. R. BENNETT, B.Sc. F.I.C., Ph.C.

Tuesday Afternoon.

THE CONFERENCE met at 2.30 p.m., adjourning at 5.30 p.m.

PRACTICE SECTION.

Chairman, J. C. UMNEY.

1. *Report on the questions addressed to the Local Pharmaceutical Associations on Secret and Proprietary Medicines.*
2. *Secret and Proprietary Medicines*, by E. F. HARRISON, B.Sc., F.I.C.
   Chairman, W. F. WELLS.
3. *Pharmaceutical Education from the Teacher's Point of View*, by Dr. F. BEDDOW.
   Chairman, J. C. UMNEY.
4. *National Insurance Bill.*

WEDNESDAY, JULY 26.

Reception of Delegates.

SCIENCE SECTION.

PAPERS.

6. *Linimentum Ammoniæ*, by F. H. ALCOCK, F.I.C.
7. *The Moisture and Ash Contents of Medicinal Extracts*, by K. C. ALLEN and T. BREWIS, F.I.C.

8. *Note on Arsenates of Strychnine*, by D. B. Dott, F.R.S.E.
9. *Note on Strychnine Hypophosphite*, by D. B. Dott, F.R.S.E.
10. *Note on Spirit of Nitrous Ether*, by D. B. Dott, F.R.S.E.
11. *Note on Solution of Sodium Ethylate*, by H. Finnemore, B.Sc.
12. *An Experiment in Peppermint Culture*, by H. John Henderson, Ph.C.
13. *White Precipitate and the Analysis of White Precipitate Ointment*, by G. D. Elsdon, B.Sc.
14. *The Constitution of Subchloride of Bismuth*, by J. B. P. Harrison.
15. *The Analysis of Diabetic Foods*, by F. W. F. Arnaud, F.I.C.
16. *Note on Bartsia Odontites*, by H. Finnemore and G. E. Town.

THURSDAY, JULY 27.

THE CONFERENCE met at the *Esplanade Hotel* at 9.30 and adjourned at 11 a.m.

1. Presentation to the Portsmouth Pharmaceutical Association of Books from the Bell and Hills' Fund.
2. To arrange Place of Meeting for 1912.
3. To elect Officers for 1911–1912.
4. To move a vote of thanks to the Mayor of Portsmouth (Alderman T. Scott Foster, J.P.,) for his reception on Monday, July 24, and for the use of the Town Hall.
5. To elect members of the Joint Standing Committee with the British Medical Association.
6. To move a vote of thanks to the authorities of His Majesty's Dockyard.
7. To move a vote of thanks to the Education Committee; the Principal of the Municipal College, Mr. Oliver Freeman; and the Vice-Principal, Dr. Beddow.
8. To move a vote of thanks to the Local Entertainment Committee.
9. To move a vote of thanks to the President.
10. To move a vote of thanks to the Press.

BRITISH PHARMACEUTICAL CONFERENCE

LIST OF DELEGATES TO THE PORTSMOUTH MEETING.

Aberdeen Pharmaceutical Association.—Messrs. J. P. Kay, W. F. Hay.

Association of Women Pharmacists—Miss M. E. Buchanan.

Bradford and District Chemists' Association.—Mr. A. Hanson.

Cambridge and District Pharmaceutical Association.—Messrs. E. H. Church, H. F. Cook, J.P., A. A. Deck, J. Evans, H. Flanders, T. J. Mallett, E. Saville Peck, M.A.

Chemists' Assistants' Association.—Messrs. F. Naylor, G. A. Tocher.

Croydon and District Pharmacists' Association.—F. W. Ashton.

Dover Chemists' Association.—Mr. J. Harcombe Cuff.

Edinburgh Chemists' Assistants and Apprentices Association.—Messrs. William Duncan, J. Rutherford Hill.

Exeter Pharmacists' Association.—Messrs. H. Wippell Gadd, P. F. Rowsell.

Harrow and District Pharmacists' Association.—Messrs. F. W. Gamble, R. L. Whigham.

London Chemists' Association.—Messrs. J. Wellesley Douglas, J. C. Pentney, F. W. Truman.

Manchester Pharmaceutical Association.—Messrs. J. Cleworth, J. Grier, M.Sc., W. G. Hughes, C. A. Johnstone, H. Kemp, A. B. Stocks, J. Rymer Young.

Midland Pharmaceutical Association.—Messrs. F. H. Alcock, F.I.C., C. Thompson.

Newcastle-on-Tyne and District Chemists' Association.—Mr. G. Foggan.

North Kent and District Pharmaceutical Association.—Messrs. R. Feaver Clarke, J.P., A. Goldthorpe.

North Staffordshire Chemists' Association.—Messrs. Edmund Jones, Weston Poole.

Nottingham and Notts Pharmaceutical Association.—Messrs. T. Freeman, A. Middleton.

Oxford and District Chemists' Association.—Messrs. J. A. R. Buchant, Alderman C. Clayton, J. Dolbear, J. Palmer.

Pharmaceutical Society of Great Britain.—Messrs. W. G. Cross, J. P., J. Harcombe Cuff, W. L. Currie, J. F. Harrington, F. A. Rogers, P. F. Rowsell, E. T. Neathercoat, C. Symes, Ph.D., Edmund White, B.Sc., F.I.C., R. Bremridge.

Pharmaceutical Society (*North British Branch*).—Messrs. J. P. Gilmour, William Giles, J.P., D. B. Dott, W. B. Cowie, W. P. Wilson.

Pharmaceutical Society of Ireland.—Sir W. J. Baxter, J.P., Messrs. G. D. Beggs, J. E. Connor, J.P., H. V. Goldon, T. N. Moffitt, J. Smith, Dr. J. A. Walsh, D. M. Watson.

Stockport and District Pharmaceutical Association.—Mr. W. P. Orrell.

Sunderland Pharmaceutical Association.—Messrs. W. Nimmo, G. P. Fairman, J. Mitchenson, C. Ranken, A. D. Purse.

Thames Valley District Pharmaceutical Association.—Messrs. F. Harvey, A. Higgs, J.P.

Tunbridge Wells and District Association of Pharmacists.—Messrs. A. E. Hobbs, Howard, J. J. Webb.

Western Pharmaceutical Association (*London*).—Messrs. C. T. Allen, W. Browne, J. A. Jennings, H. R. Procter, R. L. Whigham.

Wolverhampton and District Chemists' Association.—Messrs. W. R. Dunn, S. Phillips.

Worcester and District Chemists' Association.—J. A. Steward, J.P.

LIST OF VISITORS, PORTSMOUTH, 1911.

Aberdeen—Hay, W. F.

Altrincham—Unsworth, G. G.; Unsworth, J. W.

Barnet (*New*)—Young, R. F.

Bedlington—Foggan, Geo.

Belfast—Nichol, J. W.

Bethlehem, O.F.S.—Fernie, J., and Mrs. Fernie.

Birmingham—Twivey, A.

Birr—Goldon, H. V.

Bolton—Knott, H.

Bournemouth—Harrie, H. W.

Brighton—Tyler, A. T.

Bristol—Boorne, T. J. E.; Kirby, F. B.

Cambridge—Church, E. H.; Cook, H. F.; Mallett, T. J.; Peck, E. Saville.

Cork—Blair, R.; Harvey, J. W.; Mayne, A., and Mrs. Mayne.

Cosham—Baker, C. H.
Croydon—Brown, G., and Mrs. Brown.
Dowlais—Rees, R. P.
Dublin—Wells, W. F., Mrs. W. F. and Miss F. I. Wells.
Edinburgh—Bayne, Thos.; Dott, D. B.; Hill, J. Rutherford; Stephenson, T.
Enfield—Goldby, F.
Exeter—Gadd, H. Wippell.
Godalming—Mather, J. H.
Gravesend—Clarke, R. Feaver.
Hampstead—Browne, W.
Hove—Cripps, R. A.
Leyton—Brewis, E. T.
Liverpool—Saunders, W. H., and Mrs. Saunders.
London—Ashton, F. W.; Bennett, R. R.; Bourdas, T.; Cheetham, Percy; Daniels, M.; Finnemore, H.; Gamble, F. W., and Mrs. Gamble; Harrison, E. F.; Hecht, C. E.; Hill, C. A.; Idris, T. H. W.; Lescher, T. Edward; Maben, Thos.; Martin, Mrs. F. H.; Naylor, F.; Naylor, W. A. H.; Robinson, R. A.; Smith, A. R.; Umney, John C., and Mrs. Umney; Want, W. P.; White, Edmund; Widdowson, T. S.; Woolcock, W. J. U., and Mrs. Woolcock.
Long Melford (Suffolk)—Deane, H., and Mrs. Deane.
Manchester—Cleworth, J.; Hughes, W. Griffiths; Johnstone, C. A.; Kemp, Harry; Pidd, A. J., and Miss Pidd; Wild, J.
Nottingham—Freeman, Thos.; Middleton, A.
Oakengates—Dunn, W. R., and Mrs. Dunn.
Oxford—Barbank, Miss A.; Clayton, C.; Dolbear, J.
Portsmouth—Arnaud, F. W. F.; Fellows, W. T.; Gresswell, A.
Ryde—Barford, A. W.
Salisbury—Atkins, S. R.
Shrewsbury—Cross, W. G.
Southsea—Barlow, T. O.; Bell, W. A.; Postlethwaite, T.
Staines—Sharvill, F.
Stoke-on-Trent—Jones, E.
Sunderland—Nimmo, W.
Tunbridge Wells—Bishop, J. H.; Hobbs, A. E.
Wolverhampton—Phillips, S., and Mrs. Phillips.

GENERAL MEETING.

Tuesday, July 25.

The Sessions of Conference opened in the Municipal College at 9.30 on Tuesday morning, July 25. The President (Mr. W. F. Wells) took the chair, and he was supported by Mr. R. A. Robinson, Mr. T. H. W. Idris, Mr. S. R. Atkins, Mr. John C. Umney, Mr. E. F. Harrison, Dr. Fred Beddow, Mr. W. A. H. Naylor, Mr. T. A. White, Mr. T. O. Barlow, Mr. W. Gowen Cross, Mr. T. Stephenson, Mr. I. Bourdas, and Messrs. E. S. Peck and H. Finnemore (Hon. General Secretaries).

Councillor F. G. Foster, Chairman of the Higher Education Committee, said he had been asked to say a word or two of welcome to the members of the British Pharmaceutical Conference that day, and he did so with peculiar pleasure, as being a member of the same calling as themselves. As Chairman of the Higher Education Committee, he very heartily welcomed the Conference to the borough of Portsmouth. He hoped their deliberations would be for the good of the fraternity and would produce greater amity amongst the members of the calling. He was sure those present would agree with him that the two points he had mentioned were two essentials in the pharmaceutical calling to-day, and if the Conference could do that the Conference would not have been in vain. Perhaps they would pardon him if he said that he looked with some concern to the future. What with school clinics which had been established and the National Insurance Bill he was afraid the outlook was not very rosy for pharmacy. Of course, on humanitarian grounds pharmacists were second to no class in believing that the children should be attended to, but they did say that if the State took the matter in hand the State should pay, and it was the duty of pharmacists to band themselves together to see that their interests were not lost sight of in dealing with matters of common good. He thought they had had an object lesson in regard to the working classes of this country, who had bound themselves together, and although they might not count for very much individually, yet collectively they had great weight. It was an object lesson to those present, as pharmacists. Al-

though they might not always agree with the methods which the trade unions adopted, still, it behoved them to bind themselves together and make their voices heard as one body. With reference to the visit of the Conference to Portsmouth, he hoped it would prove particularly pleasurable. They claimed to be an ancient borough, and not only ancient, but they claimed to be up to date, as the magnificent Town Hall and the College in which they were met, costing altogether £250,000, must prove to them. If there was anything which they could do to make the visit more pleasurable and more interesting, the members of the Local Committee had only to mention their requirements and anything in their power should be done. If they went round the building, he thought that some of them would go back to the time when they were thirsting for knowledge, and they would, doubtless, compare the facilities which existed in their educational days with those existing at present. They were continually being reminded that examinations to-day were more difficult than they used to be, but it was sometimes forgotten that the facilities for acquiring knowledge were vastly improved. If in these days they did not progress, then all he had to say was that they were not doing justice to the efforts put forth on behalf of the rising generation. He hoped the members of the Conference would carry away with them pleasant recollections of their visit to Portsmouth, and he trusted they would all thoroughly enjoy themselves.

Mr. T. A. White in welcoming the Conference on behalf of the local Pharmaceutical Association, said that their visit had been looked forward to by local pharmacists with a great deal of pleasurable anticipation. He assured the visitors that everything which could possibly be done for their comfort had been, or would be, done. He hoped that all of them would think that the town had carried out the reputation of "Sunny Southsea."

Mr. R. A. Robinson responded to the welcome offered by the previous speakers. There were questions of great importance to pharmacists which were to be discussed at this meeting, but they hoped that they would also have sufficient time to enjoy the excellent arrangements made for their benefit.

The President also responded to the welcome offered. He said he thought it a great thing that they should be welcomed on that occasion by a representative of the Educational Authority. The objects of the Conference were distinctly educational,

and he heartily thanked Mr. Foster and Mr. White for the kind way in which the members had been received. He was sure that the meeting would accord a very hearty reception to "our good old warrior," Mr. S. R. Atkins. The speaker said that of recent years Mr. Atkins had not been with them as often as he would have liked, and as they would have desired, but he (the speaker) looked upon it as a great personal act of kindness that Mr. Atkins should have come to support him on that occasion. He also desired to extend a cordial welcome to Mr. Fernie, of Durban.

Apologies for Absence.

Mr. Horace Finnemore announced that letters of apology for absence had been received from Sir Edward Evans, Dr. Symes, Dr. Walsh, Messrs. N. H. Martin, T. Tyrer, R. Wright, J. F. Tocher, C. B. Allen, J. P. Gilmour, F. H. Alcock, F. W. Branson, T. M. Clague, C. E. Stuart, J. Laidlaw Ewing, Charles Umney, J. P. Kay, and J. Smith. Sir Edward Evans, in his message, said he extremely regretted that he was prevented from attending the meeting, and wished the Conference a successful gathering.

Mr. W. F. Wells then delivered his

PRESIDENTIAL ADDRESS.

The British Pharmaceutical Conference meets to-day to celebrate the forty-eighth anniversary of its foundation. We may claim that it has fully justified its existence, and that it has well carried out its functions, viz., "The encouragement of Pharmaceutical Research and the promotion of friendly intercourse and union amongst pharmacists." That sentence is now indelibly written in the annals of British Pharmacy, and it recalls to me my first duty to express, on behalf of the Members of the British Pharmaceutical Conference, our deep sense of the irreparable loss which British Pharmacy, and especially the Conference, has sustained through the death of the man who first wrote it in our records, John Attfield. He was one of the founders of the Conference, and Senior Honorary Secretary from its foundation in 1863 until 1880, when the members presented him

with 500 volumes of general literature as a token of appreciation of his great personal worth and of the great work which he had done for Pharmacy through the Conference.

Professor Attfield served as President of the Conference for two years, in 1882 and 1883, he was one of the greatest lights in the scientific circles of Pharmacy, a leader of men, with great ability, and untiring energy in the cause of Pharmacy.

As a teacher he had great opportunities of bringing the best out of his pupils; how well he succeeded in this is seen by the positions many of them fill to-day. His personal pupils knew him best, but many thousands of young pharmacists came under his guidance through his well-known book, *Attfield's Chemistry*.

He has been called to his long rest, full of years and honours, and those of us who had the great privilege of his friendship will never forget his genial personality and kindliness. His continuous love for the Conference was shown in his last message received at the Meeting last year: "I had longed to be with the British Pharmaceutical Conference at Cambridge on July 25, but alas, neuritis imprisons me; I hope the assembly will be very successful."

We have ever before our eyes in the YEAR-BOOK evidence of what the Founders did for us, and of what the Members are doing to carry out their ideals.

Herein we find proof of the splendid research work done by its members; while to see how fully it has been appreciated by others we have only to refer to the different editions of the British Pharmacopœia, the compilers of which have made liberal use of the valuable research and experimental work done by Members of the Conference. As to its second object, those of us who have been attending the Conference for some years can best bear testimony to the many happy and lasting friendships formed at its Meetings, and to the great value which the social and friendly reunions have been to us, whether viewed from a professional, business, or merely social standpoint. To-day we add another branch by inaugurating the "Practice Section," which it is hoped will make for the greater interest of the Conference, and induce more pharmacists to become members and supporters, both by subscribing to its funds and attending its Annual Meetings. Time alone can tell whether or not this change will be beneficial to the Conference, which has worked well for close on half a century, and we must carefully guard against the introduction of an undue amount of trading element

which would tend to mar its original objects and lessen its value to the professional side of Pharmacy.

The first difficulty which a President of this Conference meets with is to find a fitting subject for his address, and when one looks at the long list of names of past Presidents—men of high attainments in the pharmaceutical profession; some great chemists, others learned botanists, and all eminent specialists in some or other branch of Pharmacy; men who have written on every possible subject that could furnish us with food for thought, leaving no new ground for their successors to cover—the task of saying something new becomes more and more difficult each year. I must claim your indulgence—if the subject of mine is not exactly new, I hope it will prove of special interest at the present time, which is probably one of the most momentous through which Pharmacy has passed, having regard to the Shops' Bill and the National Insurance Bill. If I can do nothing else I can prove the truth of the old adage: "There is nothing new under the sun."

Before proceeding further I desire again to express to you how very highly I appreciate the great honour conferred upon me in electing me to the proud position of President of the British Pharmaceutical Conference. I regard it as a compliment to my country and to the pharmacists of Ireland, and I can assure you that my fellow-countrymen also fully appreciate the honour. This Conference is truly British, with its Members representative of every part of our King's great Empire, drawn together by the bonds of mutual friendship and a desire to promote the best interests of our common calling—a calling of which, I fear, comparatively few outside our ranks realize the high importance, affecting, as it does, the well-being of so large a section of the human race.

It has been well said, "Every art must rest its claim for existence upon some great public want," and I know of no avocation to which the dictum is more applicable than that of Pharmacy. This should be a very strong point in dealing with Pharmacy and Poisons Laws, but it is one invariably overlooked and by none so much as by the representatives of the Crown and our Members of Parliament. The fact that the Pharmacy and Poisons Laws of Great Britain and Ireland were, with one exception, passed—not for the benefit of the Dispensing Chemist, but solely for the protection of the King's subjects, is apparently not appreciated by the latter. In Germany every man, from the

Emperor down, has to attain proficiency at a craft, and it is said that the present Emperor, like his father, is by trade a carpenter—a very suitable calling for those whose principal work consisted of building an empire and making and repairing cabinets; it is a pity some such rule is not in force in this country. This is the age of technical education, and by all means in our power let us correspondingly educate our Members of Parliament and the public, let us lose no opportunity of so doing. If all our legislators had to learn a business or trade how different our laws would be when made by practical men instead of lawyers and theorists. If a qualification for the position of Member of Parliament was that each aspirant had to spend a short time in a pharmacy, not, of course, taking any part in the work, but watching the pharmacist at his operation, he would soon learn some of the difficulties and worries that help to make up "the daily round and common task" of the pharmacist; he would observe the nicety required in handling medicines, and realize the great danger lurking in the poisons cupboard if the pharmacist happened to be a little too liberal in his dispensing. With such knowledge he would better appreciate the value of the pharmacist and be prepared to help and not hinder his work, by making laws to protect him and so ensure the public safety.

Had the old Scotch lady been aware of the danger of liberality she would not have thus supplicated the pharmacist when he was carefully weighing the calomel: "Dinna be sae stingy wi' 't, its for a puir mitherless bairn"; but this old lady is only a type of the public of to-day, many of whom fail to see that ours is a very momentous calling, and high above that of any business; also that it is a profession second to none in its importance and vast responsibilities. When a serious illness invades the home how few persons hesitate to call in the best physician that money can procure, but also how many of them go afterwards to any cheap jack or store for the medicine. Medical authorities tell us that many a valuable life is thus sacrificed by this craze for low prices and by the use of worthless drugs. Many of the public are unwilling to learn that there is such a great variety of qualities of drugs, and that many of those sold are worse than useless. The medicine is taken, and the physician is surprised when he does not get the expected result, and the least of the evil is that valuable time is lost.

We realize it more and more every day that a man to be successful in any calling must specialize. Take the medical pro-

fession of to-day. The old general practitioner who, had supplanted the barber surgeon of past times is gone; there is now the specialist in each branch of the medical profession, and the public go to him with the utmost confidence that he is best fitted to take the case in hand. Barristers, solicitors, and the representatives of almost every profession, who aim at coming to the front, must specialize. It is the same with manufacturers. All who hope to succeed must throw their whole soul into the branch of art or craft which they adopt, and this is especially true of Pharmacy. "Jack of all trades and master of none" is an old saying; but it won't do to-day if you, as Pharmacist, want success. The moment Pharmacy is lowered to the level of a general business, as is being done so largely in our day by department stores and by limited companies of persons without any knowledge of Pharmacy, whose sole object is to "make money—honestly if ye can, but make money"; then the fine art of professional dispensing is lost, and in many cases the public health suffers. I do not of course want any one to imagine that pharmacists wish to pose as philanthropists. Perhaps some can afford that luxury, but their number has always been restricted. One thing, however, is certain, and it is this, that when any one asserts that he is running his business on philanthropic lines and selling his goods at a sacrifice, he should be well watched, especially by his wholesale friends. But it is wonderful how some of the public swallow the bait of getting something for nothing, and believing all they are told. As a learned Judge on the Irish Bench said recently: "There is no sounding the depths of human credulity." The days of Aladdin and his wonderful lamp are still with us, not for little children but for grown-ups, many of whom believe implicitly modern fairy tales. This is specially true of drugs. What becomes of the tons of damaged and useless drugs that from time to time are placed on the market? Much of the stuff which is unsaleable in the British drug market is, I believe, sent abroad, and yet finds its way back again, having been either cooked or redressed, to Great Britain and Ireland for consumption. Who is responsible for this state of affairs? The answer is the Boards of Guardians, governors of institutions, and the public, who insist on buying medicines at competitive prices at which we know they cannot be produced. It appears to me a cruel thing—I might go even farther and say a criminal thing—for those who have in their hands the care of the sick poor in public institutions

to purchase the supplies of medicines, putting price first, and too often without regard to quality or therapeutic value, the lowest tender being the one standard of merit.

In Ireland the Local Government Board compel the Guardians of Unions to accept the lowest tender. When we want to build a house we advertise for a contractor, but we protect ourselves by stating that "the lowest or any tender is not necessarily accepted."

I would, therefore, appeal to those in authority. Let them rely upon expert help—or purchase from vendors who have a good name at stake. Treat their medicines as they treat their tobacco and their wine purchases. Who buys tobacco or wines for personal consumption under a B.P. or any warranty as to the nicotine or the alcohol they contain, and under that guarantee gives the order out to the firm that will take the least money? I ask Guardians and Infirmary Governors to use the same common sense in buying the medicines for their institutions—of the qualities and characteristics of which they ostensibly can know but little—as they use in the purchase of their personal luxuries, namely, wines and tobacco, and buy the best they can afford, and not waste the public money in buying the cheapest that any unscrupulous dealer may offer.

I now proceed to deal with my chief theme, Pharmacy Laws of the United Kingdom, and before I conclude I hope to contrast them with the laws which regulate the practice of our friends in French and German pharmacy. I have stated that all the pharmacy and poisons laws of Great Britain and Ireland were, with one exception, passed, not for the benefit of the chemist, but solely for the benefit and protection of the public. A reference to these laws will bear out this statement. The first Pharmacy and Poison Act that I know of was passed by the Irish Parliament in the reign of George III, known to us as the "Apothecaries Act," entitled "An Act for the more effectually preserving the health of His Majesty's subjects, for erecting an Apothecaries' Hall in the city of Dublin, and regulating the profession of an Apothecary throughout the kingdom of Ireland." The first section of this Act reads: "Whereas not only many but great inconveniences have arisen from the want of an hall amply supplied with medicines of the purest quality, prepared under the inspection of persons well skilled in the art and mystery of such preparations, but also frequently frauds and abuses have been imposed and practised on many of his Majesty's

subjects within the city of Dublin, and the liberties thereof, and in other parts of the kingdom of Ireland, by the ignorance and unskilfulness of divers persons pretending to the art and mystery of an apothecary, to the injury of the fair trader, the disappointment of the physician, and the imminent hazard of the lives of his Majesty's faithful and loyal subjects throughout the realm."

The eighteenth section reads: "And inasmuch as many dangerous and fatal consequences have heretofore arisen from the practice of taking as apprentices to the art and mysteries of an apothecary, boys or persons disqualified by want of proper education to prepare or vend medicine, not being capable of learning their nature, differences, effects and qualities, to the imminent hazard of the lives of His Majesty's faithful and loyal subjects . . . no person or persons shall be received, taken, indentured, or employed as an apprentice, foreman or shopman, to any apothecary throughout the kingdom of Ireland until he or they shall be examined . . . after such examination (the examiners) to certify that such person or persons so applying to them shall appear to such examiners properly qualified to become an apprentice or apprentices, journeyman or journeymen, to learn or transact the business of an apothecary."

The 25th is: "No apothecary within the kingdom of Ireland shall have, take, receive, indent or hire any apprentice to learn the art and mystery of an apothecary for a lesser time or term than seven years."

In Clause XXVIII of the Act, it is further enacted "That no apothecary within the kingdom of Ireland . . . shall grind, compound, sell, or keep arsenic in the room where he compounds medicines, under a penalty of five pounds."

Section XXX tells us "That every apothecary, druggist, or other such person selling any quantity less than one pound weight of arsenic, shall at the time of such sale, and before delivery, enter in a book to be kept for that purpose, the quantity sold, and the time when it was so sold." To this is added the provisions for signature, etc., as in the Arsenic Act, 1851—with which we all are familiar—with, however, a twenty pound penalty.

This old Act of Parliament is very interesting. The one thought running through it is the safety and welfare of the public, and generally the object is to ensure the purity of medicines, which is the first and great object of this Conference.

I have referred to this Act as a Pharmacy Act, and that is no doubt what it really was supposed to be. The function of the apothecary of that time was to keep open shop for the sale and dispensing of medicines.

It is worthy of note that up to the passing of the Pharmacy Act (Ireland) 1875, the compounding of prescriptions was solely in the hands of the apothecaries in Ireland. Physicians or surgeons had no right to keep open shop for that purpose, indeed the College of Physicians required their licentiates to make oath that they would not do so.

Next in order we have

THE APOTHECARIES ACT, 1815.
55 GEO. III—194.

An "Act for better regulating the practice of Apothecaries throughout England and Wales." This Act is somewhat on the lines of the Irish Act, 1791, but Sections 2 and 3 give power to the master and wardens, or to persons properly qualified whom they may employ, to "Go and enter into any shop or shops, house or houses, cellar or cellars, of any person using or exercising the art or mystery of apothecaries. They had power to search, survey, prove and determine if the medicines, simplex or compound, they should there find were wholesome and fit for the cure, health, and ease of His Majesty's subjects; and if they should find any unlawful, deceitful, stale, out of use, unwholesome, corrupt, unmedicinable, pernicious, or hurtful, they might burn or otherwise destroy them. In the City of London, and within seven miles thereof, they might be burned before the offender's door. Under Section 5, apothecaries are bound to compound or sell any medicines, as directed by any prescription in the handwriting of any physician licensed by the Faculty of Physic in London, or by either of the Universities of Oxford or Cambridge, under penalty of £5 for first offence, £10 for the second, and for third offence to forfeit his certificate. This Act is the only statute which protects any part of medical practice in England and Wales, under it it is illegal to "act or practise as an apothecary." It has been laid down in the High Court that "an apothecary is a person who professes to judge of internal disease by its symptoms and applies himself to cure that disease by medicine."

The preambles of the Act of 1851, the next in order, "An Act to regulate the Sale of Arsenics," 14 Vict. cap. 13, which applies

to the United Kingdom, and with which we are all familiar, says: "*Whereas the unrestricted sale of arsenic facilitates the commission of crime.*" Under this Act the penalty is not to *exceed twenty pounds.* This Act was passed owing to an epidemic of secret poisoning by arsenic. We in Ireland were not free from the evil and had some notable cases; indeed in those days arsenic seemed to be the simplest and easiest way of removing friend or foe, and with very little chance of being found out.

The preamble to the British Pharmacy Act, 1852: "Whereas it is expedient for the safety of the public that persons exercising the business or calling of pharmaceutical chemists in Great Britain should possess a competent practical knowledge of pharmacy and general chemistry and other branches of useful knowledge." This Act lays down the important principle that the education of the pharmaceutist is necessary for the public protection.

In 1857 several notorious cases of poisoning came to light. To try and cope with the great evil the Government of the day brought in a Bill, by which it was proposed to repeal the Sale of Arsenic Act and to apply its provisions to a great number of dangerous substances. No poison was to be sold to any one other than a person of full age; a witness knowing the purchaser was to be present; and the purchaser was to produce a certificate signed either by a clergyman of the parish or district, by a legally qualified medical practitioner, or by a Justice of the Peace for the county or place, stating that the purchaser was known to the person signing such certificate, and might be trusted with a poison. A full entry of the sale was to be made. Packets containing poisons were to be wrapped in tinfoil as well as in paper, and bottles were to have the word "Poison" moulded upon them. Solid and liquid poisons were both to be coloured unless the certificate declared that such colouring would render the poison unfit for the purpose for which it was required. Vendors of poisons were to keep them under lock and key, and in certain vessels; and if they should be convicted of any failure to carry out the provisions of the Bill they were to be fined £20, and on second offence were to be disabled for ever from selling poisons or carrying on the business of a chemist and druggist. Only persons qualified by examination were to sell poisons. And there was a power to enter and search any shop where poisons were sold, to see if the regulations as to storage were duly obeyed. Before the Bill could be passed the Government went out of office.

Towards the end of the same year, however, a terrible poisoning calamity occurred at Bradford. A druggist in that locality had supplied a local confectioner with arsenic in mistake. The confectioner used the arsenic in the manufacture of peppermint lozenges, which were sold in the market ; twenty persons lost their lives, and over 200 were made seriously ill.

As a result of this fatality another Bill was introduced in 1859, but was withdrawn, in which power was proposed to be given to constables on the order of a magistrate to search any shop where poisons were sold, and penalties not exceeding £5 for first offence, £20 for the second, and £100 for any subsequent offence were prescribed in the case of convictions for any breach of the law.

I mention these abortive Bills to show how very strong the feeling of the Government of the day was on the subject of Poisons law, and it would appear that there was a great need for a stringent Act to cope with the great danger that existed in the free sale of poison.

We now come to the Act of 1868 to amend the Pharmacy Act of 1852, which begins with the usual " Whereas it is expedient for the safety of the public." This was the first Act to make it compulsory for the sellers of poisons to be qualified in Great Britain.

In 1870 " The Sale of Poisons Act, Ireland " was passed, which was practically Section XVII of the 1868 Act, with the addition of a clause (3) making the Adulteration Act extend to medicine. But under this Act any one could sell poisons so long as they complied with the regulations.

In 1875 the Pharmacy Act (Ireland) was passed. It was a Government measure. The preamble, after referring to the Apothecaries' Act, 1791, as " An Act for the more effectually preserving the health of His Majesty's subjects," says : " And whereas a great deficiency exists throughout Ireland of establishments and shops for the sale of medicines and compounding of prescriptions, and great inconveniences thereby arise to the public in many parts of the country." This Act took away from the apothecaries the monopoly of compounding medical prescriptions, and enabled all who qualified under the Act as pharmaceutical Chemists to dispense medical prescriptions, and, for the first time in Ireland, confined the retail sale of poisons to qualified persons. The old chemists and druggists had their right to sell poisons reserved to them, but there was no power given to register them. This led to troubles later on.

The Pharmacy Act (Ireland), 1875, Amendment Act, 1890, created a new grade, viz., "registered druggists" who were to be qualified by apprenticeship of four years and examination to sell and mix poisons (but not to compound prescriptions), while it provided for the registration of the old chemists and druggists.

We see that in all these Acts of Parliament the one idea running through them is the protection and convenience of the public, the public health and the lives of the people being considered of paramount importance.

We meet to-day for the first time in this, the greatest naval base of the world: we look around us and see the great warships and all the preparation for war, but we see writ in big letters everywhere, "Defence not defiance," and then we realize the enormous expenditure of money required to produce and keep up our great Navy, and as we think of its partner, the British Army, of both of which lines of defence we are all so proud, we ask ourselves: Is it possible that the Government keeps up its army and navy simply to give employment to the vast number of its soldiers and sailors. The answer is, No: it does so because it is absolutely necessary for the public safety.

Now none of the Pharmacy Acts say: It is necessary for the benefit of the pharmacist that certain laws should be made. The pharmacist only comes in, like the army and navy, to fill a public want, the people cannot live without him. It was not necessary he should be created, he already existed. The Pharmacy Acts then required that for *the safety and protection* of the people he should not only be educated and specially trained in his profession, but that he must be examined and proved competent to be entrusted with the onerous duties of his important calling; it was absolutely necessary that persons should be encouraged to qualify and accordingly the Government said we, in return for your services to the public, will give you something, and in future only those persons who qualify will be allowed to sell poisons or compound prescriptions. But how has that compact been carried out? Let us see—I said that all the Poison and Pharmacy Acts, *with one exception*, were passed for the protection of the public, and that one exception is, "The Poison and Pharmacy Act, 1908." The Act itself, unlike all its predecessors, says nothing about safety, and gives no reason why it should see the light of day. In fact by it the public safety is endangered; all the previous Acts recognize the fact

that arsenic is a deadly and dangerous poison, and should only be handled by trained and competent persons: this Act says, in effect, that is all nonsense, arsenic is a harmless substance and can be safely handled and sold with impunity by any ignorant and untrained person—and thus the good work of years has been undone. It is well known that this Act of 1908 was passed at the instigation, and for the benefit of, a few interested wholesale manufacturers of poisonous specialities who were able to command the Government support. We need only look at the Blue Book with the Report of the Committee to see that this is so.

When we in Ireland asked for a safeguard to be put in the Act, it was stated that the local authorities might be trusted to do what was right and would carry out the Act fairly and equitably, issuing licences only where there was a want so as not to interfere with the qualified persons. That, doubtless, was the intention of the Act, but it is a dangerous thing to put such power in the hands of the ignorant, the greedy, or the unscrupulous. What is our experience of the working of the Act? Speaking for Ireland, it is just what we anticipated, simply the repeal of the Pharmacy Acts as far as sales of poisons are concerned, and now we have practically free trade in poisons of the most deadly sorts without let or hindrance. Licences were granted to all comers and without any inquiry as to fitness of premises or of persons who were going to conduct the sales. As far as we have been able to ascertain, in no case did the "Local Authority take into consideration, before granting a licence, whether in the neighbourhood where the applicant for the licence carried on, or intends to carry on business, the reasonable requirements of the public with respect to the purchase of such poisonous substances as aforesaid were satisfied." In fact, the senior standing Council of the Pharmaceutical Society of Ireland advised that the words just quoted were in effect meaningless. It was pointed out to the Corporation of Dublin that in the case of every applicant for a licence there were one or more chemists selling agricultural poisons in the immediate vicinity of the premises of the applicants, yet every application was granted. Dublin city has over 100 chemists in it, at least one-half of whom deal in agricultural poisons. The same thing occurred in nearly every other district in Ireland—applicants for licences were rarely if ever refused. Further, we do not know of a single place where an Inspector has been appointed or where any attempt

has been made by the Local Authorities to see that the regulations are carried out, they simply take the money, grant the licence, and are done with the matter. Many of those to whom licences have been granted think that they are now entitled to sell all sorts of poisons, and are doing so, poisons are kept with other goods, are sold over the same counter as food ; no attention is given to labelling, a poison book is not in use. The police, whose duty it is to report breaches of the Acts to the Pharmaceutical Society of Ireland, are doing little or nothing to have the law respected.

To add insult to injury, one person wrote to the Registrar of the Pharmaceutical Society of Ireland to say he had got a licence, and wanted to know if the Council would now receive certificates of service with him from his apprentices to enable them to enter for the "registered druggist" examination. Another wrote to a wholesale house for a price list, saying he had got a licence and was going to sell all sorts of poisons. This man kept a bicycle shop. What may we not yet expect ?

In dealing with this subject to-day, I want to look at it from the purely pharmaceutical side, without any regard to imperial politics. I think you will agree with me that Pharmacy owes very little to any Government or party. The system of making our law is bad : we want business methods. Let the Government officials, before drafting a Bill, consult experts on the particular subject of the proposed Bill, instead of law experts. What has been our experience ? Is there any solid desire, on the part of our law makers, to get inside information, or to see what is really for the good of the public ? As an example, take the Poisons and Pharmacy Act, 1908, which was drafted for Great Britain only. Ireland was afterwards included—no one could tell why. The Irish Office in London did not know and the Irish Office in Dublin knew nothing of it. The Privy Council Office of Great Britain did not want to have anything to say to Ireland in the matter, but in the final draft there was Ireland, till the Earl of Crewe, acting for the Government, struck the reference to Ireland out, and said he would not include Ireland unless it was shown to be necessary after inquiry. A Committee of both Houses was appointed to take evidence and report on the subject. The President of the Pharmaceutical Society of Ireland wrote to the noble chairman asking him to hear evidence on behalf of that society. He replied that it was not intended to take any evidence from the Pharmaceutical Society of

Ireland. On pressure being brought to bear he consented to hear two representatives, who when they attended before the Committee were not allowed to give any direct evidence. No latitude was given to them, such as was allowed to the witnesses hostile to Pharmacy. There was no evidence by experts from the Veterinary Department of the Board of Agriculture of Ireland, the Department that would know from practical experience whether it was necessary to extend the Bill to Ireland or not. The result was as anticipated from the outset. The Committee reported in favour of Ireland being included. The Committee was a farce, with very poor acting. I shall mention a fact which always strikes me as a most curious one in reference to this subject. In 1904 a "Departmental Committee on Dipping and Treatment of Sheep" made a Report, as a result of which sheep dipping was made compulsory in the United Kingdom. A perusal of the evidence annexed to the Report is most interesting. The evidence indicates that sheep dips containing arsenic are dangerous to the persons using them; to the sheep on which they are used; to other animals about the farm; to persons working and treating the wool, and even to persons using the articles made from wool on which arsenic was used in sheep dipping. The Chairman of the Wool Trade Section of the Bradford Chamber of Commerce, in giving evidence before the Committee, was asked (Question 1589): "Have you any experience with reference to arsenious or other poisonous dips?" "Yes, we have had an unfortunate experience with arsenic. It seems that arsenic, in certain processes that it has to go through, becomes insoluble, and when that happens it goes forward through all the processes of washing, scouring, dyeing, finishing, and all the processes that you can think of. In the case of Norway they absolutely decline to take any goods that have practically any trace of arsenic whatsoever. So keen are they about this that they actually make it apply to carpets as well as to anything that can possibly come in contact with the skin." (1590) "Is it your opinion that that arsenic was introduced through the wool?" "Yes." (1591) "Through the effect of the dips or the treatment of the wool previous to your dealing with it?" "Yes, I have no doubt about it." (1592) "It could not have come in in any other process in the dyeing?" "No."

It is an open secret that many members of the Committee were in favour of prohibiting the use of arsenical dips altogether.

The evidence given shows that there are other dips much more efficacious and perfectly safe. The Report of the Committee bears out this statement.

Following up this evidence, the Board of Agriculture of Great Britain published a leaflet with three "Prescriptions for Sheep Dips (approved by the Department) for Sheep Scab." The Irish Department adopted and published the same. None of these dips contained arsenic. On the second edition of the leaflet the following footnote was added:

"Although no preparation containing arsenic has been included in the above-mentioned schedule, it is not to be assumed from the omission that arsenic dips are not thoroughly effective against sheep scab. The possible danger to human beings attendant upon the preparation of arsenical dips renders it advisable, however, that they should be compounded by qualified persons only."

In the face of all this Mr. Russell, Vice-President of the Irish Agricultural Department, when giving evidence in favour of the extension of the Poisons and Pharmacy Bill to Ireland, when asked by Mr. Idris, M.P. (a member of the Committee): "Why did you recommend these three (non-poisonous dips) first then? How was it?" "Because of the difficulty of getting the arsenical dips." And this in the face of evidence by wholesale traders, that arsenical dips were freely sold by unregistered persons throughout Ireland. What we want to know is: Why the Poisons and Pharmacy Act, 1908, was ever passed; why this free trade in arsenic? The Department has since the passing of the Act given ample proof that it was not necessary by approving and publishing a list of a vast number of non-poisonous dips, as being reliable and effectual for the prevention and cure of disease, dips that can be sold freely by any unregistered person. Arsenic in wall-papers in bygone days caused much illness. Its use in wall-papers is not now allowed. There is room for further inquiry as to the effects of arsenic in wool when worn as clothing. We occasionally hear of persons getting blood poisoning from stockings. What causes it?

Again, what effect has the lavish use of arsenical weed killers in gardens and on streets?

Thanks to a disastrous case of poisoning by arsenical beer which occurred some years ago in the north of England, the use of arsenical sulphides is now prohibited in the preparation of cheap brewing sugar. Still, danger lurks and may remain

undiscovered for long periods. The symptoms of arsenical poisoning simulate most completely ailments which are common to humanity, and unless suspicion be aroused numbers may be sent to their rest by this poison, and as I have shown, have been in the past on many occasions, without medical or chemical recognition of the true cause of the fatalities. Why then this callous indifference to sowing the country broadcast with tins and bottles of arsenic and other potent poisons, if only the formality of obtaining a licence be gone through? Let local authorities take warning and stay their hand before some national loss or disaster occurs to open their eyes to the danger of placing poisons in the hands of the unskilled.

As another example of the attitude of governments and of parliaments to the pharmaceutical profession, let us take the "Report as to the practice of Medicine and Surgery by unqualified persons in the United Kingdom," issued as a Blue Book by the Privy Council Office. The General Medical Council requested the Government to appoint a "Royal Commission" to inquire into this subject. Instead of granting the request and hearing all sides, in 1909 the Local Government Board requested the Lord President of the Council to ascertain from medical officers of health "whether the practice of medicine and surgery by unqualified persons is assuming larger proportions in their districts, and what effects are produced by such practice on the health of their districts." This is surely a very large order and open to very wide construction. We are told that it is possible to prove anything by statistics, but here there are no statistics available, and the doctors seem to have got on very well without them. We may ask how Question No. 2—"Whether the practice is assuming larger proportions"—can be fairly answered without some data to go on. Now, if ever there was a one-sided inquiry we have it here; I venture to say a more cruel, unjust, vicious and misleading report never was published.

The first words in the Summary of Replies are: "Prescribing by chemists is stated to be so common as to be practically universal throughout the country." "In the replies received qualified and unqualified chemists are not always distinguished, but it would seem that the latter prescribe more recklessly than the former." Well, this kind admission is something to be thankful for. A perusal of the Blue Book is enough to make one's blood boil; we may well ask, has the Department that

issued such a Report any regard for common justice or fairness. The chemists are all unclean. Here you have between 16,000 and 17,000 qualified Pharmacists, members of an honourable profession, men who, if they had not the confidence and respect of those amongst whom they live, could not succeed in their business, and they are placed in the dock with herbalists, bone setters, and itinerant quacks, not tried but condemned by an antagonistic jury, without process of law or the opportunity of a single word in self defence; the result was a monstrous piece of injustice to honourable men. But who are the jury that condemn us? Many of them trade rivals of the men they stab in the dark, and many of them men who show themselves to be very small-minded indeed, and are only able to judge others by that little standard of self: they encroach on the chemists' preserves, and then the latter in self-defence retaliates. I think also that a great injustice has been done to many of the medical men who sent in reports by the person who drew up the "Summary of Replies," for he has drawn conclusions from the replies that are not warranted by them. Let us take the first: "Prescribing by chemists is stated to be so common as to be practically universal throughout the country"; but what do the medical officers say in regard to this? From England and Wales there are 217 replies, 38 say "unqualified practice," "non-existent" or "practically non-existent"; 65 do not mention the chemist at all; 103 include the chemist, but many of them qualify the reply by "chemists only treat very minor complaints," "Prescribing by chemists probably less than in most towns," "A few chemists may prescribe." From Scotland there are 97 replies, 63 of which do not mention the chemist; and from Ireland, where we find the most vicious replies, out of 137, 103 do not mention the chemist. Taking all the replies, in 182 districts it is stated the chemists do prescribe, and in 269 they are not named amongst those who are stated to do so; then add to the latter figures those who did not reply, showing then that if figures prove anything, it is that the statement, "that prescribing by chemists is stated to be so common as to be practically universal throughout the country," is absolutely without foundation, and such a report should never have been sanctioned by the Privy Council Office, and presented to both Houses of Parliament. Other of the deductions in summary are equally misleading.

But how do the public look at the matter. *Truth* says:

"The question of counter prescribing by chemists need hardly be made a matter for special legislation. It is more in the nature of a professional quarrel between the chemists and the doctors, for the medical practitioner who does his own dispensing can hardly complain if the chemist occasionally prescribes a pill or a draught to the man who comes to him and asks for a remedy for some simple ailment." Professor Huxley once asked: "Is a man who has a sudden attack of pain in tooth or stomach not to be permitted to go to the nearest druggist's shop for something that will relieve him? The notion is preposterous." But the question is really not worth discussing, as it would be utterly impracticable to stop the practice "over the counter," even if it were desirable.

Now, I don't want to be misunderstood; I have no sympathy with unqualified practice of either Medicine or Pharmacy, and in saying this I believe I am only expressing the views of every member of this Conference. The problem is a difficult one, but there is only one solution of it—Let the doctors give up dispensing and things will soon right themselves. How is the unfortunate chemist to live who seldom or never sees a prescription after all the expense of qualifying. It is a crime, according to the Blue Book, for him to recommend "infants' food," soothing syrup, teething powders, or even to sell a toothache cure.

We can hardly think that any great number of medical men will approve of the sweeping charges made against chemists generally. In many places the best of good feeling exists between the two professions—this is especially so where the medical men confine themselves to writing prescriptions, and in return the chemists act loyally towards them. We hope that this good feeling may not only continue but extend till it is universal. We look with confidence to the Joint Committee of the British Medical Association and the Conference to help towards this great end.

Having thus shown the intentions of the Legislature as to our Poison and Pharmacy Laws, I desire now for comparison to give you some particulars of the French and German laws regulating the same subjects. As you are all so familiar with the British Acts, and time being an object, I shall not specifically refer to them, but shall content myself with a short resume of the Irish Act to show the differences in the practice of Pharmacy in the several countries, and show how the laws of these countries operate both in the interest of the public and the pharmacist,

The Pharmacy Act (Ireland), 1875, was drafted very much on the lines of the British Pharmacy Act, 1868. There is, however, one very important difference, viz.: That the compounding of all medical prescriptions, whether they contain poisons or not, is confined to qualified persons. Then we in Ireland have taken more out of our Act than our British confrères. By Section XVI, the Council of the Pharmaceutical Society of Ireland are given power, subject to the provisions of the Act, to make regulations with respect to its meetings, examinations and other matters necessary for the carrying out of the Act. The last sentence of the Section reads: "Generally for all such other matters as may be necessary for the due execution of this Act." It is a curious fact that there is not one word about apprenticeship in the Act, but the clause referred to was found sufficiently wide to enable the Council to pass a by-law requiring a four years' apprenticeship. This was ratified by the Lord Lieutenant in Council, and thus had the force and effect of the Act. A compulsory curriculum was instituted, and as a natural corollary the Society opened schools of chemistry, materia medica and botany to give the necessary education to students.

The following are the regulations for candidates for the qualification of Licentiate of the Pharmaceutical Society of Ireland.

Preliminary Examination.—To be passed prior to four years' service at Pharmacy. The subjects are Latin, English, arithmetic, algebra, geometry, elementary theoretical chemistry. The candidate must pass in one of the following optional subjects: Elementary physics and mechanics, the rudiments of botany, French, German, or any modern language. A candidate who obtains 70 per cent. of total marks, and not less than 50 per cent. in each subject, is awarded a pass with honours.

The Licence Examination.—The candidate must be 21 years of age and produce a declaration that he or she has served a bona fide engagement for a term of four years as apprentice or assistant with and in the sole employment of a pharmaceutical chemist, chemist and druggist of Great Britain, or an apothecary, or a firm of legally qualified pharmaceutical chemists, chemists and druggists of Great Britain, or apothecaries, in an open shop, and the candidate must spend the business day with his employer. This latter part of the regulation became necessary owing to candidates spending a few hours daily with a phar-

maceutical chemist and then getting the necessary declaration of service.

The candidate must have attended a course of Practical Chemistry of not less than three months' duration in the laboratory of an approved Institution, and have actually worked at the bench for 100 hours, also a course of lectures on botany and materia medica at some school recognized by the Pharmaceutical Society.

There is also an examination for assistants to Pharmaceutical Chemists, and such assistants as shall pass this examination shall be competent to transact the business of a licentiate of the Pharmaceutical Society in his temporary absence, but shall not be entitled to conduct a business or to keep open shop on his own account. The candidate must have been engaged at Practical Pharmacy for at least four years.

I am indebted to the Editor of *The Chemist and Druggist* for obtaining for me from the French and German correspondents of that journal the latest information regarding the training and examinations that pharmacists have to go through in France and Germany, as well as particulars in regard to the sale of medicaments, the dispensing of prescriptions and other duties that ordinarily fall to the pharmacist.

France

The essential difference in principle between the Pharmacy laws of the United Kingdom and those of France is that the French laws, which date back to the Revolution and whose foundations were laid long before then, give the pharmacist a definite place in the community, specific services to perform for the community, and ensure that none shall poach upon the preserves fenced by these laws.

No one can enter Pharmacy as an apprentice until he or she has gone through the first French University grade and obtained the *baccalaureat*, which is a degree in Arts usually obtained by persons between the ages of sixteen and eighteen years. It is equivalent to, but not quite so high as, our degree of B.A. Since November 1, 1910, it has been necessary for apprentices to take a course of study lasting five years, consisting of one year's apprenticeship in a pharmacy, and four years at a school of pharmacy—the latter involving sixteen quarterly courses of study and practical work. Each year the apprentice has to pass an examination. Three of the examinations are of a pre-

liminary nature, and, finally, in order to obtain the diploma of a *pharmacien*, the student has to pass a professional examination, which comprises subjects more scientific and of a quasi-medical nature, since they include the analysis of food and drugs, bacteriology and certain departments of public health—a circumstance due to the fact that in France, as well as in other parts of the Continent, pharmacists relieve physicians of certain work which physicians tenaciously stick to in this country, such as pathological tests, while they also perform work that is here relegated to public analysts. In 1909 changes were made in the qualifying examination, ensuring not only that the *pharmacien* is a pharmacist, but is also accomplished in professional subjects allied to Pharmacy.

The Law as regards the Dispensing of Medical Prescriptions. The French law confers on pharmacists the sole right of dispensing medical prescriptions: The only exception being that in remote villages, where no pharmacists exist, doctors are allowed exceptionally to dispense medicines.

Medicines can only be dispensed by qualified men, so that in a small pharmacy the proprietor of which alone is qualified, in case of his absence, prescriptions have to, or ought to, await his return. Prosecutions take place from time to time for contravening this regulation.

The Legal Arrangements regarding the Sale by Retail of Medicines and Allied Products.—The legal arrangements in France are that the retail sale of drugs, medicines and allied products connected with the art of healing, are exclusively confined to qualified pharmacists holding the French diploma.

A medicament is considered "any substance, simple or compound, having medicinal qualities and presented as such," that is, the destination or the use characterizes a medicament. The same substance prepared for another use may no longer be considered as a medicament. This does not apply to poisons.

The proper working and management of pharmacies is under the supervision of Pharmacy Inspectors, and the law regarding their functions was revised in 1905. The business of the inspectors is to interpret the law in a fair spirit, without applying the text too rigorously. They take samples of doubtful products for analysis, and prosecutions are carried out in case of fraud.

The pharmacist must keep a register on which all the prescriptions he dispenses are copied. According to French law,

a pharmacist can own but one pharmacy, but he can take a partner or partners.

Patent medicines (i.e. secret remedies) are a somewhat sore point with French pharmacists. Legally, their sale is prohibited, but in practice that is impossible and their sale is very large: such sale, however, is confined to pharmacists and cannot be encroached on by grocers, etc., as in Great Britain. The chief objection of pharmacists, naturally, is that patent medicines injure legitimate dispensing and leave very little profit. For a good many years past attempts have been made to come to some practical arrangement for securing a reasonable profit on such preparations, but so far without general and definite satisfaction being obtained. There is no patent medicine stamp in France. The attempts which are made to keep foreign patent medicines out of France are also interesting. Foreign makers frequently get over the difficulty of being prohibited from importing their goods by manufacturing in that country. (See also paragraph in French News, *C. and D.*, May 27, 1911.)

The French people are noted for their attachment to simples, and the pharmacy laws provide for the sale of herbs by herbalists, but this business is of a non-pharmaceutical nature and there is no pretence on the part of the herbalists to ape pharmacists by the way they carry on business. They are there to meet a public want, and make no pretence to be other than they seem.

Germany

In Germany the practice of Pharmacy is strictly confined to *Apothekers*, and a custom exists there which is unknown either here or in France, of strictly limiting the number of pharmacies, each pharmacy throughout the Empire being licensed by the State. The consequence is that *Apothekers* cannot start business as such until a vacancy for a pharmacy occurs and he obtains or purchases the concession to carry on the business of an old-established pharmacy or to open a new one where the growth of the population warrants the State granting a new concession.

The sale of all medicines is restricted solely to the pharmacists, subject to the regulations regarding the sale of remedial agents. In the course of time, however, a breach was laid in this privilege, and the druggists (*Drogisten*) began to appear on the scene. Druggist is a designation that any person may assume; there is

no examination, licensing, etc. required to open a druggist's shop. The druggists as such do not enjoy any privileges and what they do can be done by any other tradesman, only they have become the natural competitors of the pharmacist on several points. Thus, it is permitted to sell outside the pharmacy, tincture of valerian, spirit of ether, etc., but otherwise no mixture of any kind. Also they are allowed to sell zinc ointment for animals only, and to circumvent the law many have ingeniously printed inside the cover of the box a statement to the effect that "although this ointment is sold for the use of animals, it is just as good as that obtainable in the pharmacy." In addition they sell chemicals, but strictly speaking they are not allowed to sell them if they are demanded for use as a remedy. They also sell practically all the patent foods on the market, and constantly proceedings are taken against druggists to establish whether a preparation is a food or a medicine, if it is the former the druggist may sell it, if the latter he is forbidden to do so, thus Scott's Emulsion has figured frequently in these cases, and often one court decides differently from another, so that in one town a druggist may sell a preparation which he is forbidden to do in another part of the country. The druggist sells, in addition, groceries, photographic articles, toilet requisites, sponges, soaps, colours, chemicals, infants' foods, fly catchers, etc., in fact his business is made up of what figures largely among the British chemist's counter sales, many of these being sold by pharmacists in Germany. The druggist are largely recruited from *Apothekers* who despair of obtaining a concession after waiting to buy a privileged pharmacy.

As stated above, the dispensing may only be done by *Apothekers*. The doctors are also forbidden to dispense, and have been fined for illegal dispensing, but are permitted to make injections and like. They have to purchase ready-made solutions in a pharmacy, and pay for them according to the official prescription tariff like anybody else.

All prescriptions have to be made up in a pharmacy, entered in a book kept for this purpose, and charged according to the official prescription tariff; the prescription is returned to the client. The pharmacist has to see that the doctor has not overstepped the maximum dose for potent drugs mentioned in the pharmacopœia, or otherwise made an appalling mistake, in which case he must communicate with the prescriber; or if this is not possible, reduce the dose and inform the prescriber

of the step he has taken. The repetition of prescriptions is regulated by special provisions, in some cases it is forbidden to repeat a prescription calling for certain potent drugs unless it is signed each time by a medical man.

As regards education and qualification, the apprentice pharmacist has to produce a certificate showing that he has attended a higher School (gymnasium, or real gymnasium) for eight years, and has studied Latin. Armed with this certificate he may become an apprentice in a regular pharmacy. Apprenticeship lasts for three years, but in the case of those who have had ten years' schooling and have passed the matriculation examination the apprenticeship is reduced to two years. During this time the apprentice has to study chemistry, physics, botany, pharmacognosy, pharmacy proper and pharmacy law, he has to make a certain number of preparations and write an official account on the subject, and in addition has to make a collection of dried plants. At the end of apprenticeship he goes up for the first examination, which used to be called the assistant examination. This resembles the Minor Examination of Great Britain, and includes written work and practical work on the same lines as is the case in England. When this examination has been passed the candidate has to spend two years as assistant in pharmacies, and is not in a position to act as manager or do anything independent. He may, in certain cases, take the place of his principal for a few days, but it would be a punishable offence for him to act as a *locum tenens*. At the end of the two years of assistantship the man enters the University for a period of two years. Here he has to attend lectures on chemistry, botany, physics, pharmaceutical chemistry, analytical chemistry, and pharmacognosy. At the same time he has to do a lot of practical work in the chemical and botanical laboratory. In the chemical laboratory the whole course of analysis is worked through, and one has to make various preparations in addition; the analytical work embraces qualitative, quantitative and titrimetric analysis, and also the analysis of various substances for poisons. In botany one goes through a course of microscopic work, in addition to the practical work in pharmacognosy, which also deals with the microscopic analysis of powdered drugs, in view of the requirements of the pharmacopœia. A course of sterilization has also to be attended. Of course the conditions of study at a German University differ materially from those in an English institution, and must be taken into consideration.

At the end of the time the pharmacist has to go up for the State examination. This lasts over a week, and consists of written work and practical tests. The latter include the preparation of two chemical bodies, a qualitative, a quantitative, and a volumetric analysis, in addition to the hunt for a poison in some substance given to the candidate. The other oral examinations bear on pharmaceutical, botanical and physical subjects. If the candidate is successful (his official title is by now "candidate of Pharmacy," and he puts this on his visiting cards), he is not yet quite finished, for the actual diploma of having passed the State examination is not delivered into his hands by the Ministry of the country in which he passed it, until one year has elapsed, and he has to produce a certificate regarding his conduct as an assistant during this time. In possession of his diploma he is now a full fledged *Apotheker*; he may wait about twenty years for a concession working as an assistant, or if he can win the heart of a moneyed maiden, dazzled by the prospect of playing the *Frau Apotheker* (in Germany the wife is always addressed by her husband's title) he may buy for anything up to £50,000 a privileged pharmacy.

From the foregoing it will be apparent that the interests of the *pharmacien* and *Apotheker* are well looked after by the State, and the fact that the sale and dispensing of medicine, whether simply inoccuous or poisonous, is strictly confined to pharmacists, and there are such provisions in regard to industrial requirements as to ensure the liberty of the subject consistent with the safety of the community.

Might not the British Government, with advantage, take a lesson from our French and German neighbours and when importing German-made insurance schemes, go a little further and include an order for a few Pharmacy Laws "made in Germany."

Had time permitted I would have liked to contrast the differences between the British and Continental military pharmaceutical services. Whereas with us there is no recognition by our Army authorities of the statutory conditions enforced by the Pharmacy Act for the dispensing of medical prescriptions, it is a first principle in the armies of France, Germany, Austria-Hungary, the United States and other nations that those who enter their armies to perform pharmaceutical services shall first have conformed to the State regulations for qualification as a pharmacist. Whereas our army authorities are a law unto themselves in this matter, the armies of the rest of the world are law-abiding

on pharmaceutical affairs, their dispensers being first certified to be competent to perform their professional duties, and they rank as officers in their armies.

There are several other Acts which are closely associated with Pharmacy, the most important of which is the Foods and Drugs Act, in which there is much room for improvement. I will only mention two points. The Acts should be amended so as to make conviction more certain when fraud is clear, at present there are too many technical points available under which offenders get off. Public Health Committees are put to considerable trouble and expense, all to no purpose. Doctors, surgeries, public institutions, and all other places from which medicines are supplied to the public should be brought within the scope of the Acts.

We have referred to the different laws which govern Pharmacy in the United Kingdom, and have seen the object the legislators had in view. We are sadly aware how their good intentions have been frustrated. How great a blow was the decision of the superior Courts in the case of the "Pharmaceutical Society *v.* The London and Provincial Supply Association, Ltd." I have been informed by members of the legal profession that in law it was a bad decision. It may, however, be law, but it does not appear to us to be justice. To the lay mind it was an extraordinary decision, for there could be no doubt, from the context of the Act, as to what the legislator intended, viz., a personal qualification for all those keeping open shop. What a far-reaching effect that decision has had on our profession. I am convinced from long experience of the working of the Irish Pharmacy Laws, that nothing short of the personal qualification of the owner of a pharmacy gives any real guarantee to the public. Our experience is that in many cases the unqualified owner, most likely a man who has failed to pass the examination, conducts the business, and the qualified man is merely a cover, with no power or control, and frequently he may not be on the premises. It is not a question of preventing free trade, as some suppose, but of lawful and just protection. The State demands, and rightly so, education, skill, qualification, examination, and registration, and having done that, those who have complied with the demand may surely ask for a fair share of protection.

I would that we had a closer bond between all those connected with Pharmacy in the United Kingdom; our interests are identical, from the apprentice to the employer. What Napoleon

said of his army, that "Every private soldier carried a marshal's baton in his knapsack," is equally true of Pharmacy; the assistant of to-day is the employer of to-morrow. Many forget this and are forging rods to punish themselves. What has done more to injure Pharmacy than limited companies of unqualified persons trading as chemists? We want no Act of Parliament to stop this, if every pharmacist was loyal to himself and his fellows; shorter hours and a little better pay induce many to sell their services to the unqualified; their highest ambition is £2 10*s.* a week, and the marshal's baton is left in the knapsack. It is a curious fact that the educated pharmacist is one of the few to act the traitor. Take any tradesman who joins his society, he will starve himself and his family before he will act disloyally to his fellow-workers, and though we may not approve of all his actions, we must respect him for this loyalty. Let our assistants remember that their action is undermining true Pharmacy. If only our assistants, when forming associations for their mutual benefit, would make the first plank "loyalty to our craft," they would find it a very sure foundation to build on, and for their own future prosperity.

Looking at Pharmacy to-day the prospects look dark, with the "Shops Bill" and the "National Insurance Bill" before us, specially the latter, which if passed in its present form, will certainly injure many a pharmacist, and will be specially hurtful to those in country places. We may well ask: "Is life worth living?" Is Pharmacy, as a profession, likely to improve, and are the conditions and emoluments good enough to induce educated young men to take it up as a calling, and to follow it as their life's work. Don't think I am pessimistic; I like to look at the bright side of life, but we must take things as we find them and try our level best to improve our calling, bearing in mind that we must leave it either better or worse for our connexion with it, and remembering that, while there is this great craze for low prices, there are very many of the public, in every grade of life, who do appreciate the work of the pharmacist, and willingly pay for his services and for high-grade medicines. It is due to these and such as these, the discriminating members of the public, that our old historic pharmacies built their reputation and that others are doing likewise to-day. So let us take courage and follow in the footsteps of our old historic leaders, each doing his little best, and hope for better and brighter days.

Shadow and Sun—so, too, our lives are made:
Yet think how great the sun, how small the shade.

Mr. S. R. Atkins, senior Past President, said it was his privilege, for age had its privileges as well as its penalties, to propose a vote of thanks to the President for the admirable address which he had given them. If they would tolerate for a moment garrulity in an old man, he would like to remind them that this was the forty-eighth meeting of the Conference, and of these meetings he had attended thirty-eight. Only failing health and age prevented his being in constant attendance at Portsmouth. He was not a "founder" of the Conference—he wished he were—although he was nearly a founderer in the year in which the Conference first met, for he was travelling on the Alps in that year, and nearly came to grief one night on the mountain. He started attending the Conference at the Bath meeting in 1864. How many were the privileges which he had reaped and enjoyed from his associations with that Conference. It was not only the nearness of his residence which brought him there to-day, but also the presence of his old esteemed friend Mr. Wells in the presidential chair. Thirteen years ago the Conference met at Belfast, and afterwards he went to Dublin and was treated with real Irish hospitality by Mr. and Mrs. Wells. If they wanted hospitality they could get it in England, they could get it in Scotland; but if they wanted the pure article, unadulterated, they must go to Ireland for it. He was taken down one day by his host to Bray, and had a delightful day. Mr. Wells was not the "Vicar of Bray"—his friendships abide; therefore he had come to-day to pay his tribute. He hoped when they who were present to-day returned to their homes, they would look up Sir Walter Besant's autobiography, they would find in it an interesting account of Portsea and the district round about. Besant was born in St. George's Square, Portsea, in 1836, and when he was in Salisbury a few years ago he had the opportunity of some pleasant talks with him about this very interesting district. He dared not refer at length to the admirable address they had heard. Mr. Wells stated some of the difficulties which he had no doubt had presented themselves to others in considering the question of the subject for the presidential address. Certainly he experienced that difficulty in 1887. His friend Mr. Naylor was his right-hand man then, and suggested that he should try and make a *resumé* of the Victorian era from a phar-

maceutical point of view. In regard to Mr. Wells' address, he regarded it as most practical, most valuable. He thought his epitome of the Acts of Parliament was most instructive. He would not analyse it further. He would just take the address home, read it over, perhaps write about it, and speak about it, and do all he could to make it known. It had given him the utmost, or he might say the supremest, satisfaction to be present to pay his personal tribute to one of his most valued friends. The address was to him a most valuable lesson; it had been an incentive to effort, and he hoped it might prove so to them all. He proposed that they accorded to the President their very best thanks, if there were three degrees of thanks, for his address.

Mr. W. A. H. Naylor, another Past President of the Conference, said he was unable to recognize any special fitness for having been invited to second the motion, but it was a peculiar pleasure to him to perform that very humble duty. In the first place, he felt that they were labouring under a spell which had been cast over them by that most delightful and felicitous speech from their dear old friend, Mr. Atkins. In the second place, he felt that no words which could possibly be expressed could in any degree enhance the value of the most charming and admirable address which they had listened to that morning. Some of them had experienced difficulty in selecting a subject for an address, but he did not remember that the subject which had been dealt with so ably and so fully that morning had ever been touched upon by any previous President of the Conference. He need scarcely remind them that they had in Mr. Wells a man of wide experience, of vast knowledge, a man of considerable administrative ability, and a man who was thoroughly well equipped for the duty which he had to discharge that morning. It gave him the greatest possible pleasure to second this vote of thanks to Mr. Wells.

The motion was carried with great enthusiasm, and the President briefly responded.

Mr. E. Saville Peck next read the

Annual Report of the Executive

The Executive Committee has pleasure in presenting its annual report for 1911. The Committee has met on five occasions and transacted the necessary business of the year. As

in our last report, so in this, we have to record the death of a great worker in Pharmacy. On March 18, 1911, there passed away at Watford, in his seventy-sixth year, John Attfield, who not only was one of the founders of this Conference, but through his initiative and energy contributed so largely to its long-continued success. It would be quite impossible in a short annual report to do more than briefly acknowledge his many activities for the advancement of Pharmacy in general and of this Conference in particular. He was for seventeen years joint Secretary and Editor of the Transactions. He filled the presidential chair at Southampton in 1882 and at Southport in 1883, and his addresses on those occasions are instinct with those high ideals for Pharmacy which he carried into practice in his work as Professor of Chemistry in the Pharmaceutical Society's School, in his editorship of the British Pharmacopœia, and in his many other capacities. His death marks the passing of a great personality, which has made a lasting impression on his numerous pharmaceutical students.

At the first meeting of the Executive in October, 1910, the Research Sub-Committee was appointed, and it has revised the research list. At the annual meeting at Cambridge last year it was unanimously agreed that subjects relating to the practice of Pharmacy should be included in the programme of the annual meetings, and at a subsequent meeting of the Executive a sub-committee, consisting of Messrs. W. F. Wells (President), J. C. Umney (Treasurer), F. W. Gamble, E. F. Harrison, and the Honorary Secretaries was appointed to carry this into effect. This Sub-Committee has met on three occasions, and on its recommendation the following have been sanctioned by the Executive :—

1. That the session devoted to the practice of Pharmacy should be held on Tuesday in the Conference week at 2.30 p.m.

2. That the Chairman of the meeting should not necessarily be the President of the Conference, but should be chosen with special reference to the subjects under discussion.

Discussions upon the following subjects have been arranged for the meeting at Portsmouth :—(1) Secret and Proprietary Medicines ; (2) Pharmaceutical Education ; (3) National Insurance Bill. A list of questions on secret and proprietary medicines was sent to the local Pharmaceutical Associations, and a report based on the answers to these will be submitted at the meeting of this section.

A meeting of the Conference members of the Joint Standing Committee of the British Medical Association and the British Pharmaceutical Conference was held on Wednesday, May 31, to consider what line of action should be taken at the forthcoming meeting with the B.M.A. on June 15. It was decided that a circular should be distributed to the different Pharmaceutical Associations asking for their support upon the following points, which the Conference members could lay before the Joint Standing Committee :—(1) Having regard to the public safety, dispensing under the Government scheme should be done through the channels provided by the Pharmacy Acts, and that provision should be made in the Bill itself for the carrying out of the Chancellor's expressed intention that this work should be done by pharmacists. (2) The remuneration for dispensing and supply of drugs be arranged with (*a*) the Insurance Commissioners, or (*b*) the Local Health Committee on a tariff system and not on a capitation basis. (3) There be a free choice to the insured person of those pharmacists who are willing to go on the panel to supply medicine. (4) Pharmacists should be directly represented upon the Advisory Committee and the Local Health Committee.

Replies were received from seventy-one local Pharmaceutical Associations assuring the Conference of their support.

The meeting of the Joint Standing Committee was held at the offices of the British Medical Association, 429, Strand, London, W.C., on Thursday, June 15, 1911, under the chairmanship of Dr. J. H. Taylor. There were also present, as representatives of the British Medical Association, Sir H. T. Butlin, Bart. (President of the Association), Mr. T. Jenner Verrall, Dr. C. H. Wise, and Dr. A. Cox, Deputy Medical Secretary ; as representatives of the British Pharmaceutical Conference, Mr. W. F. Wells (President), Mr. C. T. Allen, Mr. T. Maltby Claguc, Mr. G. C. Druce, Mr. H. Wippell Gadd, Mr. F. W. Gamble, Mr. A. MacMillan, Mr. J. F. Tocher, and Mr. E. Savile Peck and Mr. H. Finnemore (Honorary General Secretaries).

The Joint Committee had under consideration questions of mutual interest to medical practitioners and pharmacists arising in connexion with the National Insurance Bill. The following resolutions bearing thereon were unanimously passed, and it was agreed that such recommendations should be submitted to the respective parent bodies :—

A. That the principle be affirmed that the dispensing under

the Government scheme be done through the channels provided by the Pharmacy Acts, and that provision should be made in the National Insurance Bill itself for the carrying out of the Chancellor's expressed intention that this work should be done by pharmacists.

B. That this Joint Standing Committee, noting the principle of the representation of the medical profession on the Insurance Commissioners, the Advisory Committee, and the Local Health Committee, expresses the opinion that an extension of this principle to pharmacists would be in the interests of the community.

C. That this Joint Standing Committee further favours the constitution of lists of local registered medical practitioners and pharmacists willing to give medical attendance and to supply medicines respectively under the jurisdiction of the Local Health Committee, and is of opinion that all registered persons should be entitled to be placed upon the respective lists.

D. That this Joint Standing Committee agrees to endeavour to secure free choice on the part of the insured of medical practitioners and pharmacists from the list.

E. That this Joint Standing Committee considers that the remuneration for dispensing and supply of drugs should be arranged with the Local Health Committee on a scale system and not on a capitation basis.

F. That this Joint Standing Committee considers that provision should be made for exclusion from medical and maternity benefits of persons whose average income from all sources exceeds £2 per week.

G. That this Joint Standing Committee considers that every effort should be made to secure for medical practitioners and pharmacists in Ireland the same professional and financial privileges and rights as are accorded to these professions in Great Britain.

These resolutions were considered at a meeting of the Council of the British Medical Association, held on Wednesday, July 5, 1911, when the Council passed the following resolutions :—

1. That this Council affirms the principle that the dispensing under the Government scheme should be done through the channels provided by the Pharmacy Acts, and that provision should be made in the National Insurance Bill itself for the carrying out of the expressed intention

of the Chancellor of the Exchequer that this work should be done by pharmacists or medical practitioners.

2. That this Council further favours the constitution of lists of pharmacists under the jurisdiction of Local Health Committees, and is of opinion that all registered pharmacists should be entitled to be placed upon the lists.

3. That this Council agrees to endeavour to secure free choice, on the part of the insured, of pharmacists from the lists.

4. That this Council considers that the remuneration for dispensing and supply of drugs should be arranged with the Local Health Committees on a scale system and not on a capitation basis.

5. That this Council considers that every effort should be made to secure for pharmacists in Ireland the same professional and financial privileges and rights as are accorded to them in Great Britain.

Your Executive, at its meeting on Wednesday, July 12, ratified the original resolutions passed by the Joint Standing Committee, and expressed regret that the Council of the British Medical Association did not do likewise.

Mr. J. Hearn, Assistant Secretary, resigned his post in October, and the Executive passed a resolution thanking him for his services during the past eleven years. Every effort is being made to maintain the high standard of the *Year-Book*. By a slight readjustment of prices it was found possible to give last year a volume containing 120 pages more than in 1909 at the small increase of cost of £14. Thanks are due to the Editor, Mr. J. O. Braithwaite, and to the printers, Messrs. Butler and Tanner, for the arrangements which resulted in last year's volume being produced at an earlier date than usual. Attention has been recently drawn by the printers to the fact that there exists a surplus of back numbers of the *Year-Book* and of the Indexes. The Executive has decided to supply these valuable works of reference to the local Pharmaceutical Associations which apply for them free of charge. The Executive would like to take this opportunity of thanking those members who contribute papers to the annual meetings, as it is the origination and encouragement of such work which is the primary object of the Conference.

Complaints have sometimes been made in the past that no

facilities were given by the railway authorities to members attending the annual meetings. Although every effort has been made by the Conference to obtain these they have rarely been successful, and it is therefore with the greater pleasure that the Executive announces that the railway companies have now decided to grant to members and their friends attending the annual meeting at Portsmouth the tickets for the double journey at a single fare and a quarter. During the past year we have had the gratifying addition of over sixty new members, and these have been obtained by the personal influence of members rather than by official application from headquarters. The Executive urges upon members the necessity of doing all they can to increase the membership of the Conference; unless this be done the Conference will be seriously hampered in its efforts to continue the new work it has recently undertaken.

Sir WILLIAM BAXTER, President of the Pharmaceutical Society of Ireland, in proposing the adoption of the report, said that he felt it an honour to be asked by the Committee to move the adoption of the annual report. In doing so he first of all expressed his pleasure in finding himself in such happy surroundings in that important town, or rather "city," for if the princely hospitality of its municipal chief which so many had enjoyed, and also the position it occupied as premier naval port of Britain and its increasing population be taken into account, then Portsmouth should indeed be the "city" of Portsmouth, and Alderman Foster its popular Lord Mayor. It was unnecessary for him to say that another element which gave him additional pleasure was the fact that the Committee in their wisdom had elected to the presidential chair a past-President of his own, the Irish Society, a gentleman whose devotion to the interests of pharmacy had been commensurate with his whole professional career, whose attendance at the Conference gatherings had been continuous for a quarter of a century, and whose duties in conducting the Conference proceedings would be less taxing on his authority than those of the Speaker during the previous day's sitting in the House of Commons. (Laughter.)

The PRESIDENT, in calling upon Mr. Kemp to second the motion, said they were very delighted to see him present once again at a meeting of Conference, after his recent indisposition.

Mr. HARRY KEMP, Manchester, said that he seconded the motion with the greatest pleasure, especially as he noticed that during the last twelve months the Executive had decided on a

new venture—viz., the Practice Section. He called to mind the time when he was a member of the Executive he moved a motion to the effect that such a section should be instituted. On that occasion he had the support of Mr. Umney, who seconded the motion in order to enable it to be discussed. Mr. Tyrer, who was in the chair at the time, hoped that he would not be discouraged, but he did not think that the time was ripe for such an alteration of the Conference constitution. It was not the first time he had been in the minority of one and eventually seen his scheme come to fruition, and he noticed with exceeding pleasure the introduction of this Practice Section, although he did not claim to be directly responsible for its inclusion. Mr. Kemp hoped that this section would mean an increased membership. He thought it would. He was the last one to think that the scientific side of the Conference proceedings would suffer from the inclusion of this new section. But he did think that it was fitting that practice could be discussed with great advantage. There were some members of Conference who were of the opinion that these subjects of practice had not been adequately discussed. They would have an opportunity at that Conference, and especially in view of the National Insurance Bill, and the discussions should be most instructive. He had no hesitation in saying that after he had interviewed Members of Parliament in this question, he found that they did give pharmacists credit for having educated the public mind in this subject, and explaining points which had been difficult to comprehend. He, therefore, heartily seconded the adoption of the report.

After the adoption of the report, the PRESIDENT, in a few words, emphasized the notice of the Secretaries as to the stock of back numbers of the *Year-Book* which were in hand, and said that applications for these from secretaries of local associations would be welcomed, and supplies would be sent if such associations would pay the carriage. He also pressed members and friends to take advantage of the special railway facilities which the Secretaries had been able to arrange in order to assure these facilities being granted in future years.

FINANCIAL STATEMENT

Mr. JOHN C. UMNEY (Treasurer), in presenting the financial statement for the year, said that the balance-sheet had been

distributed at the beginning of this year and covered a period of eighteen months. The statement showed that there was a deficit of only £25 on the Conference funds, although they had paid for the *Year-Book* for 1910. (Applause.) He had now to make the gratifying announcement that the subscriptions had very considerably increased, and they hoped that with the accession of members which he believed would result from the development of the Practice Section they would have a large balance on the right side; but he did not desire members to think that there was no necessity to pay their subscriptions because they had an increased membership.

Mr. W. A. Bell, in moving that the statement be received and adopted, said that they were all very pleased to hear that the finances of the Conference were in such a sound and healthy state.

Miss Buchanan seconded the motion, and the report was adopted.

FINANCIAL STATEMENT FOR PERIOD

British Pharmaceutical

Dr.		£	s.	d.	£	s.	d.
1909.							
July 1.	To Assets forward from last Balance Sheet :—						
	Cash at Bank	140	15	8			
	Cash in Secretary's hands	0	10	2			
					141	5	10
1910.							
Dec. 31.	„ Members' Subscriptions received by Secretary	495	12	7			
	„ Members' Subscriptions paid through Bankers	8	2	6			
					503	15	1
	„ Amount received for Index				0	3	6
	„ Sale of 1909 *Year-Book* through Publishers	12	13	4			
	„ „ „ 1910 „ „ „	8	3	2			
	„ „ „ *Year-Book* by Secretary	5	2	0			
					25	18	6
	„ Advertisements in 1909 *Year-Book*	73	8	6			
	„ „ „ 1910 „ „	52	15	8			
					126	4	2
	„ Liabilities on open Accounts :—						
	Butler & Tanner	52	1	0			
	Editor (balance of salary)	25	0	0			
					77	1	0
	„ Bell and Hills Fund				14	14	2

Deficit Dec. 31, 1910, is £25 6*s.* 3*d.*

	£	s.	d.
Viz., Liabilities.	77	1	0
Assets	51	14	9
	£25	6	3

					£889	2	3

1909.	*The Bell and Hills Fund.*	£	s.	d.	£	s.	d.
July 1.	To Balance as last Account	21	13	2			
	„ Dividends on Consols	12	14	6			
					34	7	8
	By Kimpton's Accounts for Books				19	13	6
					£14	14	2

Assets : In account with British Pharmaceutical Conference £360 2½% Consolidated Stock.

JULY 1, 1909, TO DECEMBER 31, 1910.

Conference.

		£ s. d.	£ s. d. (Cr.)
1909.	By Bell and Hills Fund, last Balance Sheet		21 13 2
	„ Expenses of *Year-Book*, 1909 :—		
	Printing, Publishing and Binding	145 6 2	
	Posting and Distributing	13 9 6	
	Advertising, £1 2*s.* 6*d.*; Publishers' Charges, 2*s.*	1 4 6	
	Commission on Advertisements	18 7 1	
			178 7 3
	„ Expenses of *Year-Book*, 1910 :—		
	Printing, Publishing and Binding	156 15 9	
	Posting and Distributing	12 15 2	
	Advertising, £1 2*s.* 6*d.*; Publishers' Charges, 1*s.*	1 3 6	
	Commission on Advertisements	13 3 11	
			183 18 4
	„ Editor's Salary		150 0 0
	„ Assistant Secretary at Annual Meetings (1909 and 1910).	20 0 0	
	„ Salary to date and rent of office	84 7 6	
			104 7 6
	„ Postages, £20 12*s.* 10*d.*; Editor, 14*s.* 11*d.*	21 7 9	
	„ Petty Cash	8 18 4	
	„ Purchase of Typewriter	6 0 0	
			36 6 1
	„ Printing and Stationery :—		
	McCorquodale & Co.	17 19 8	
	Typing at Cambridge.	3 3 10	
	J. Hall & Son, £1 2*s.*; Butler & Tanner, 10*s.* 6*d.*	1 12 6	
			22 16 0
	„ Foreign Journals for Editor	4 1 6	
	„ Bank Charges	0 6 1	
			4 7 7
	„ Liabilities as last Balance Sheet, since paid :—		
	Butler & Tanner	119 16 5	
	Assistant Secretary's Salary	13 15 0	
	Cheque (Butler & Tanner) cancelled	2 0 2	
			135 11 7
	„ Balance at Bank	1 17 8	
	„ Cash in Secretary's hands	3 5 8	
	„ Amount due from J. & A. Churchill	46 11 5	
			51 14 9
			£889 2 3

The British Pharmaceutical Conference Research Fund.

		£ s. d.
1909. July 1.	To Balance	25 2 0

Examined and found correct,
January 24, 1911.

I. Bourdas.
W. Prior Robinson.

SCIENCE SECTION

The reading of papers communicated to the Conference was then proceeded with.

FURTHER NOTE ON PODOPHYLLUM EMODI

By John C. Umney, F.C.S.

At the present time, when pharmacopœial revision is much in our minds, it is well, I think, to call further attention to a controversy—if one may use so strong an expression—concerning a particular drug, which should, if it be possible, be settled before the publication of a new British Pharmacopœia. I refer to the relative medicinal values of the resins of the two species of podophyllum, the American, *Podophyllum peltatum*, and the Indian, *Podophyllum emodi*. The Indian rhizome has been recognized in the Indian Addendum, and it has been officially suggested that it should be included in a new British Pharmacopœia, the suggestion being based principally upon the chemical researches of Dunstan and Henry (*Journ. Chem. Soc.*, 1898, **73,** 209), to which subsequent reference will be made, and the physiological experiments of MacKenzie and Dixon (*Edin. Med. Journ.*, November, 1898). The second report of the Indigenous Drugs Committee of India, which was issued in the summer of 1909, dealt with *Podophyllum emodi* amongst other drugs. Some medical opinions recorded in that Committee's report indicated that the purgative action of *P. emodi* resin is better than that of podophyllum resin (B.P.), as the drug does not produce griping, whilst other medical opinions were that it is about equal in value to the pharmacopœial resin. In doses of 1 to 1½ grains it was stated to be "rather a drastic purge." To those medical opinions, or rather the interpretation of them, I took some exception (*Chem. and Drug.*, August 28, 1909, 385), and summarized the investigations of the drug which had been made in this country and elsewhere, and the deductions from these examinations, emphasizing the point that the doses employed were much larger than those used in this country, at any rate, of the American resin. I urged that samples of the Indian drug obtained from different districts and altitudes, collected at different periods of the year, and dried under constant conditions, should be placed at the disposal of investigators, for, as I pointed out, the results obtained indicated great difference in the proportion of resin, its constitution and activity, according to the time of

the year that the drug had been collected. Shortly afterwards I received a communication from the Indigenous Drugs Committee from the Indian Museum, Sudder Street, Calcutta, asking whether I was prepared to have a series of experiments conducted upon the drug, collected under different conditions and at different seasons, in accordance with my suggestion. I naturally replied that I should be only too glad to have this investigation carried out, and it was subsequent to this correspondence that I duly received from Mr. I. H. Burkill a supply of the rhizome gathered after fruiting.

Dunstan and Henry showed that the rhizomes of wild plants of the *P. emodi* varied in their content of resin and podophyllotoxin, which variation (if confirmed) might naturally be overcome by the cultivation of the plant and collection at a definite, correctly determined period. The preference for the fall-dug rhizome of *P. peltatum* in America is well known, and is not based entirely on the actual resin percentage. The present investigation is more than ever convincing that it is upon natural variations in the resin most probably at different seasons of the year that the varying results have been obtained. The changes in the composition of plant constituents according to season are well known, and cannot be better exemplified than in two pharmacopœial instances, aconite root and cherry laurel leaves. It will be remembered that the B.P., 1885, required aconite root to be collected in the winter or early spring, a requisition that P. W. Squire proved was not well founded (*P.J.*, February 16, 1889, 645–646), whilst the inquiry of Charles Umney showed that cherry laurel leaves produced much more hydrocyanic acid on distillation in March (*P.J.* [2], **10,** 468).

Resin Percentage

All workers are agreed that the proportion of resin in the Indian variety is on an average twice that of the American, the following percentages being stated :—

Dymock and Hooper	12 per cent.
J. C. Umney	11·4 per cent.
Dunstan and Henry	9 to 12 per cent.

Composition of Resin

It is not easy to review the results obtained by different workers because of differences in processes and nomenclature of constituents. It would certainly appear, however, that picropodophyllin is not an actual constituent of the drug, but

is formed by decomposition of podophyllotoxin, which, together with podophyllo-resin, an indefinite amorphous substance, represents the activity of the drug.

The examination of the rhizome now placed at my disposal was conducted by Mr. C. T. Bennett, B.Sc., on lines exactly following the researches of Dunstan and Henry. The rhizome as received was largely mixed with stalks, of which 4 oz. was separated, 21 ozs. of rhizome being left for examination, which lost on drying 9·5 per cent., representing moisture. 370 Gm. of the fine powder was extracted with 95 per cent. alcohol, and the tincture poured into acidulated water according to the process recommended by the British Pharmacopœia. The resin was filtered off and dried without heat in a vacuum desiccator for several weeks. The moisture contained in this product was 2·8 per cent., which is some 2 or 3 per cent. less than that usually found in the Podophyllum Resin B.P. of commerce. This resin was used for the physiological tests referred to later. A further 10 Gm. was extracted with absolute alcohol—the alcohol recovered and the residue washed with water and dried at 100°C. The yield of resin by this process was found to be 10·79 per cent. A good deal of fatty and gelatinous matter was removed in the washing. Another 20 Gm. of the root was mixed with lime, exhausted with chloroform, and the choroform evaporated. The residue was dissolved in absolute alcohol, mixed with lime and evaporated to dryness. More alcohol was added and again evaporated to dryness. The residue was then extracted with hot alcohol and the filtered solution evaporated to dryness. By this means 5·43 per cent. of picropodophyllin was obtained, corresponding to an equal weight of podophyllotoxin, with which it is isomeric. This proportion is so much higher than I obtained in 1892 that I made a comparison, following the same process, of a sample of American resin and that prepared and reported on in 1892. The following figures were obtained, indicating that the present sample might be expected to be twice as strong as the old sample or the American resin. The researches of Schofield (*G.B.*, 1910, 122) indicated 63·2 and 62·7 per cent. in Indian resin, against 24·04 and 25·7 in the American.

PROPORTION OF PODOPHYLLOTOXIN IN RESIN

Indian, 1892	25·0 per cent.
Indian, after fruiting, 1910	50·3 per cent.
American (*P. peltatum*)	22·9 per cent.

Though it may not appear wise at present to judge of the therapeutic value of the resin by chemical analysis alone, yet it must be said that the physiological tests so far recorded show divergence, and seem to support the chemistry of the resin. I found in 1892 that the action of the resin—not by any means "casual observations," as Dr. Henry has called them—in doses of ½ to 2 grains to seventeen persons over a period of a fortnight was not so marked as that of *P. peltatum*. Drs. MacKenzie and Dixon found it greater, and therefore here one might expect a difference in the composition of the resin. Now finding that the resin percentage is similar, but the podophyllotoxin much higher, as much as 5·43 per cent. in the rhizome, one naturally expected to find greater activity. As Dr. W. E. Dixon had undertaken with Dr. MacKenzie the investigation of the relative activity of the Indian and American resins as prepared in the Imperial Institute laboratories, I asked him to examine the resin prepared upon the present occasion, and to report upon the same. I append the conclusions at which he has arrived.

"I have found on my own vile body that ⅛ grain acts efficiently, and nine other willing victims also record similar results, though varying somewhat according to natural susceptibility to such drugs."

I trust that the Indigenous Drugs Committee of India, to whom I now tender my best thanks, will continue their inquiry, and place at my disposal other samples of the rhizome from different districts and collected at varying seasons. That this rhizome collected after flowering is much richer in podophyllotoxin and of greater activity than that which I previously examined is certain, and my regret is that I was not able to ascertain for certain the period of the year at which the drug upon which I first experimented in 1892 was collected.

Discussion

Mr. W. A. H. Naylor asked if it were proposed to include *Podophyllum emodi* in the next British Pharmacopœia, and how it was proposed to ascertain at what season of the year it was gathered, and at what altitude.

Mr. F. Ransom agreed that the work undertaken in connexion with this drug was of great importance, and he was glad to hear that it was proposed to include it in the Pharmacopœia. It would be useful in view of the fact that it gave us a drug which

could be produced in the British Empire, and which might be especially useful in case of any difficulty in obtaining supplies from America.

Mr. W. Gowen Cross inquired whether Mr. Umney had noticed any difference in the drug according to the altitude at which it was collected.

Mr. J. C. Pentney asked if it were cheaper than the official drug.

Mr. Umney, in replying to the questions, said that when the first shipment came over in 1892 it was sold very cheaply, but from that time he was not aware that any large quantity had been imported. In reply to Mr. Naylor's question, he said that the inclusion of the drug in the Pharmacopœia had been considered, in fact it was included in the Indian and Colonial Addendum, for which the late Dr. Attfield was responsible. He also stated, in reply to Mr. Cross, that the Indigenous Drugs Committee of India were carefully watching the question of the altitude at which the root should be collected.

The President proposed a hearty vote of thanks to Mr. Umney for his paper, and this was accorded by the meeting.

The following paper was read by Mr. E. H. Farr :—

THE SUPPOSED LOSS OF MORPHINE IN THE PREPARATION OF TINCTURE OF OPIUM

By E. H. Farr, F.C.S., and R. Wright, F.C.S.,
Pharmaceutical Chemists.

From time to time statements have been made to the effect that in the conversion of opium into extract or tincture a loss of alkaloid results, or, to put the matter with strict accuracy, that the quantity of morphine shown by the official assay of a sample of opium is always greater than the amount found in the finished product, even when the utmost care has been taken to secure the perfect exhaustion of the drug. In the latter case, needless to say, the official process for the preparation of the tincture cannot have been followed, but this does not affect the question at issue.

The experiments detailed in this note were carried out with a view of testing the accuracy of the statements above referred to, and in case of their correctness to find out whether the loss of alkaloid was a fixed or variable one. For the purpose of our experiments seven samples of opium were obtained from leading

drug houses. They varied in weight from 3½ oz. to 9½ oz., and some were perceptibly harder than others. All were submitted to the following general method of treatment. In cases where much extraneous matter was present, e.g. poppy leaves and rumex fruits, this was removed by scraping or shaving. The remainder was cut up and well beaten in an iron mortar until the mass was plastic and perfectly homogeneous, and in this condition was used for the preparation of the tincture. A portion was weighed and dried over a water-bath until it was brought into a condition suitable for reducing to powder. It was allowed to cool, the weight again taken, and then reduced to a uniform powder in a mortar and passed through a No. 20 sieve. The product was finally triturated in a mortar until thoroughly mixed, and was then transferred to an air-tight container.

The powdered opium was assayed by the official process and both in this and in the assay of the tinctures the official details were as far as possible adhered to, so as to make the whole series of determinations strictly comparative. A little difficulty was occasioned by the fact that whereas the official assay of opium is made on the powder, the tincture is prepared from moist opium. This was got over by calculating the figure for powdered opium into terms of the moist, on the basis of the recorded loss of moisture in drying. In this way the excess or deficiency can be clearly shown. The methods employed for the exhaustion of the tincture marcs varied somewhat, and for this reason the *modus operandi* followed in each case will be fully described.

Sample I

Forty Gm. lost in drying 8·65 Gm. = 21·625 per cent. Assay of dry powder gave :—

(1) 14·61 per cent. morphine.
(2) 14·69 per cent. morphine.
Average 14·65 per cent.

14·65 per cent. in dry powder = by calculation 11·48 in moist.

Preparation and assay of tincture

Experiment 1.—75 Gm. opium was treated as described in the B.P., 422 c.c. strong tincture was obtained. The marc was exhausted by repeated treatment with boiling water, the liquor and pressings converted into extract, the latter being assayed by the official process.

Yield of morphine by tincture	= 6·20 Gm.
Yield of morphine by extract	= 1·418 Gm.
Total morphine from 75 Gm. opium	= 7·618 Gm.
Total morphine from 100 Gm. opium	= 10·16 Gm.

Experiment 2.—30 Gm. opium was put through the official process for tincture, the marc being subsequently percolated with 45 per cent. alcohol; 1,200 c.c. weak percolate being collected. The yield was as follows :—

Morphine from strong tincture	= 2·536 Gm.
Morphine from weak tincture	= 0·724 Gm.
Total morphine from 30 Gm. opium	= 3·260 Gm.
Total morphine from 100 Gm. opium	= 10·86 Gm.

Average yield of morphine by 100 Gm. moist opium = 10·51 Gm.

Sample II

Forty Gm. lost in drying 8·8 Gm. = 22 per cent. Assay of powder gave :—

(1) 17·03 per cent. morphine.
(2) 17·00 per cent. morphine.
Average 17·015 per cent.

17·015 per cent. in powder = by calculation 13·27 per cent. in moist.

Preparation and Assay of Tincture

Experiment 1.—75 Gm. opium was converted into tincture by the B.P. process, the marc being percolated with 45 per cent. alcohol till the percolate was colourless. 436 c.c. strong tincture and 1000 c.c. weak percolate was obtained. The assay showed :—

Morphine from strong tincture	= 7·986 Gm.
Morphine from weak percolate	= 1·642 Gm.
Total morphine from 75 Gm. opium	= 9·628 Gm.
Morphine from 100 Gm. opium	= 12·828 Gm.

Experiment 2.—30 Gm. opium was treated as in Experiment 1. 130 c.c. strong tincture and 750 c.c. weak percolate were obtained. The assay showed :—

Morphine from strong tincture	= 2·360 Gm.
Morphine from weak percolate	= 1·496 Gm.
Morphine from 30 Gm. opium	= 3·856 Gm.
Morphine from 100 Gm. opium	= 25·85 Gm.
Average yield by 100 Gm. moist opium	= 12·84 Gm.

Sample III

Forty Gm. lost in drying 7·9 Gm. = 19·8 per cent. Assay of powder gave :—

(1) 14·54 per cent.
(2) 14·22 per cent.
Average, 14·38 per cent. morphine.
14·38 in dry = 11·53 per cent. in moist (by calculation).

Preparation and Assay of Tincture

Experiment 1.—37·5 Gm. was treated as in early stage of B.P. process, the marc and fluid then transferred to a percolator, and percolation carried on continuously with 45 per cent. alcohol until 196 c.c. strong and 1200 c.c. weak percolate had been collected. The assay showed :—

Morphine from strong tincture	=	3·520 Gm.
Morphine from weak percolate	=	0·707 Gm.
Total morphine from 37·5 Gm. moist opium	=	4·227 Gm.
Morphine from 100 Gm. moist opium	=	11·27 Gm.

Experiment 2.—30 Gm. opium was treated as in Experiment 1 The assay showed :—

Morphine from strong tincture	=	2·824 Gm.
Morphine from weak percolate	=	0·451 Gm.
Morphine from 30 Gm. moist opium	=	3·275 Gm.
Morphine from 100 Gm. moist opium	=	10·92 Gm.
Average yield by 100 Gm. moist opium	=	11·09 Gm.

Sample IV

Forty Gm. lost in drying 6·8 Gm. = 17 per cent. Assay of powder gave :—

(1) 16·59 per cent. morphine.
(2) 16·54 per cent. morphine.
Average, 16·56 per cent.
16·56 in dry = by calculation 13·74 per cent. in moist.

Preparation and Assay of Tincture

Experiment 1.—30 Gm. moist opium was extracted by maceration and percolation with 45 per cent. alcohol, and the products on assay gave the following results :—

Morphine from strong tincture	=	3·256 Gm.
Morphine from weak percolate	=	0·579 Gm.
Total morphine from 30 Gm. moist opium	=	3·835 Gm.
Morphine from 100 Gm. moist opium	=	12·78 Gm.

Experiment 2.—30 Gm. moist opium treated as above gave the following results :—

Morphine from strong tincture	= 3·440 Gm.
Morphine from weak percolate	= 0·522 Gm.
Total morphine from 30 Gm. opium	= 3·962 Gm.
Morphine from 100 Gm. moist opium	= 13·20 Gm. morphine.
Average yield by 100 Gm. moist opium	= 12·99 Gm.

Sample V

Forty Gm. lost in drying 8·6 Gm. = 21·5 per cent. Assay of powder gave :—

(1) 13·72 per cent.
(2) 13·68 per cent.
Average, 13·70 per cent. morphine.
13·70 in dry = by calculation 10·75 per cent. in moist.

PREPARATION AND ASSAY OF TINCTURE

Experiment 1.—30 Gm. was extracted by percolation with 45 per cent. alcohol, 200 c.c. strong percolate and 1000 c.c. weak percolate being collected. The assay showed :—

Morphine from strong percolate	= 2·352 Gm.
Morphine from weak percolate	= 0·730 Gm.
Morphine from 30 Gm. moist opium	= 3·082 Gm.
Morphine from 100 Gm. moist opium	= 10·27 Gm.

Experiment 2.—30 Gm. was treated as above. The resulting percolates were assayed by Dott's process. The results were as follows :—

Morphine from strong percolate	= 2·392 Gm.
Morphine from weak percolate	= 0·806 Gm.
Total morphine from 30 Gm. opium	= 3·198 Gm.
Total morphine from 100 Gm. opium	= 10·66 Gm.
Average yield by 100 Gm. moist opium	= 10·46 Gm.

Sample VI

In this case the bulked opium was thoroughly softened with water and the whole well mixed. 21 Gm. lost in drying 6·0 Gm. = 28·57 per cent. The powder gave 14·0 per cent. morphine = 10 per cent. in the moist drug.

The whole of the sample was worked up into tincture, percolation being carried on until 192 fl. oz. (calculated to be about B.P.

tincture strength) had been collected. The marc was subsequently extracted by percolation with 45 per cent. alcohol until the percolate was practically colourless. The strong tincture was assayed by the official process and the weak percolate by Dott's. The results were as follows :—

Morphine from strong tincture	=	2·634 oz.
Morphine from weak tincture	=	0·045 oz.
Total morphine from 27 oz. moist opium	=	2·679 oz.
Total morphine from 100 oz. moist opium	=	9·92 oz.

Sample VII

Thirteen Gm. lost in drying 2·2 Gm. = 17·1 per cent. Assay of powder gave 13·93 per cent. morphine = 11·55 in moist (by calculation).

PREPARATION AND ASSAY OF TINCTURE

Eighteen Gm. moist opium was treated by the official process for making the tincture, and the marc subsequently percolated with 45 per cent. alcohol until the percolate was practically colourless. 120 c.c. strong tincture was obtained and was assayed by the official process, the weak percolate by Dott's. The result was as follows :—

Morphine from strong tincture	=	1·788 Gm.
Morphine from weak percolate	=	0·104 Gm.
Total morphine from 18 Gm. moist opium	=	1·892 Gm.
Total morphine from 100 Gm. moist opium	=	10·51 Gm.

Summary of Results (A)

Calculated on basis of official assay processes.

Sample No.	Per cent. Morphine in Moist Opium.	Per cent. Morphine in Tinctures and Marcs.	Excess or Deficiency.	Percentage Deficiency.
1 . . .	11·48	10·51	− 0·97	8·45
2 . . .	13·27	12·84	− 0·43	3·24
3 . . .	11·54	11·09	− 0·45	3·9
4 . . .	13·74	12·99	− 0·75	5·4
5 . . .	10·75	10·46	− 0·29	2·7
6 . . .	10·0	9·92	− 0·08	0·8
7 . . .	11·55	10·51	− 1·04	9·0

Summary of Results (B)

Calculated on basis of alterations proposed by Farr and Wright.[1]

Sample.	Per cent. Morphine in Moist Opium.	Per cent. Morphine from Tinctures and Marcs.	Total Gain or Loss.	Percentage Gain or Loss.
1 . . .	11·25	10·64	−0·62	5·5 loss
2 . . .	13·03	13·0	−0·03	0·23 loss
3 . . .	11·32	11·23	−0·09	0·7 loss
4 . . .	13·47	13·15	−0·33	2·4 loss
5 . . .	10·54	10·59	+0·05	0·47 gain
6 . . .	9·81	10·04	+0·23	2·3 gain
7 . . .	11·32	10·64	−0·68	6·0 loss

General Conclusions

The results of our experiments, as shown in the first summary, go to prove that when the official methods are followed throughout there is always a loss of morphine. In the seven samples of opium-worked upon this varied between the limits of 0·8 per cent. and 9·0 per cent. of the whole, with an average for the whole series of 4·78 per cent. That there is a loss has been admitted for some time past, and in papers published by Dowzard [2] and ourselves [3] certain alterations have been proposed as regards the correct volume of filtrate to be collected in the assay of powdered opium and the extent of dilution of the mixture of the tincture liquors after admixture with lime.

In the second summary the effect is shown of the changes proposed by us upon the results of the present series of experiments. It will be seen, on reference to this summary, that the effect of those changes would be to reduce the loss to a maximum of 6 per cent., and an average for the whole series of 2·4 per cent. of the total, while in two cases the morphine found in the tinctures was in excess of the quantity estimated to be present in the opium used.

In the light of these results it is evident that, notwithstanding the amount of careful thought and experimental work which has been devoted to the subject of opium assay, there is still room for a thorough and systematic review of the whole subject. If the principles of the process had been radically unsound we

[1] *Ph. Journ.*, **58,** pp. 164 *et seq.*
[2] *Ph. Journ.*, **71,** p. 909; and **72,** p. 397.
[3] *Ph. Journ.*, **78,** pp. 164 *et seq.*

should have expected to find the deficiency of morphine to be more constant and regular than is the case.

The loss appears to us to be more probably due to occlusion of the alkaloid, rendering its complete extraction by water or alcohol a matter of practical impossibility, or to some other factor or factors which have hitherto escaped recognition. We intend, however, to look further into the matter and to embody our results in a subsequent communication.

Discussion

Mr. R. A. Cripps said that the matter of the assay of opium was one in which he had taken considerable interest for many years. He was one of those who held the opinion that there was no appreciable loss of morphine in the preparation of tincture of opium, provided the tincture is made from the *moist* drug. His own custom has been to macerate the opium in thin pieces in cold or slightly warm water till thoroughly disintegrated, rub the marc through a coarse sieve, and then add the rectified spirit. In consequence of correspondence with his friend Mr. R. Wright, he had made a trial batch of about 10 gallons of tincture. This tincture was assayed, and diluted to 0·75 per cent. whilst still standing on the marc, pressed, and the pressed marc thoroughly mixed and assayed. The loss at 100°C. indicated (with allowance for extractive) that this marc contained 50·1 per cent. of tincture, and, therefore, the amount taken for assay (10 Gm.) would contain 0·0375 Gm. of morphine. The actual assay yielded 0·036 Gm.; hence, in this case no morphine remained in the residual marc. In his opinion, the discrepancies in opinions of workers arose from a faulty assay process; the method of the B.P. proved, in his hands, *erratic*; apart altogether from the errors in volume of filtrate, etc., referred to by the authors (which might account for 0·2 or 0·3 per cent. error), he had found some samples of opium yield as much as 1 per cent. morphine in excess, whereas other samples yielded results very little above the truth. He was not prepared to give any reason for this erratic behaviour of the test, but could only state it as a fact of his experience. Another factor for consideration was the presence of basic calcium salts in the precipitated morphine, but this he scarcely considered to be so important as some had suggested—he would place the error from this cause at a figure seldom in excess of 0·3 or 0·4.

Mr. D. B. Dott said in the first place he would like to say how much indebted they were to Messrs. Farr and Wright for this valuable contribution on a difficult subject. Any one who has worked on the opium alkaloids knew the difficulties surrounding the whole subject. The apparent loss of morphine was due partly to the fact that the assay processes for opium and tincture of opium were not in harmony; but there was also probably a further loss, which was a variable quantity, just as opium itself varied in composition. He agreed with Mr. Cripps that the official assay process, though giving constant results with the same sample, could not be relied on as giving an exact indication of the morphine content of a particular sample of opium. The head of the Government Laboratory, U.S.A., had no faith in any opium assay process in which an aliquot part of what was supposed or calculated to represent a certain fraction of the whole is taken. He agreed with that view.

Mr. W. A. H. Naylor suggested that the cause of the discrepancy was the variation in the composition of the opium.

Mr. John C. Umney thanked Mr. Farr for the valuable paper, and said it was quite true that members of the Committee of Reference were somewhat divided in their opinions as to whether there was any loss of morphine in the preparation of tincture of opium or not. He and some of his friends came to the conclusion that there was a loss. Other members of the Committee thought not. It was with the object of clearing up the point that the Committee of Reference asked Messrs. Farr and Wright to investigate their side of the question. They were pleased that there was now no great divergence of opinion between Messrs. Farr and Wright and themselves. Mr. Naylor suggested that the point of the inquiry was that opium varied very much in its composition. It should be remembered that the morphine might be present either in the free state, or as sulphate or meconate. But the great point was to start with an opium the composition of which they knew, and until they were able to do that he did not think they would be able to satisfy themselves as to whether there was a loss or not, which was to say that they ought to define the conditions under which they worked. Is this possible? He (the speaker) thought it was.

Mr. E. F. Harrison said that Messrs. Farr and Wright were such veterans in work of this kind that it appeared somewhat rash to express any scepticism in regard to any of their conclusions, but he felt compelled to do so. The authors had not

only made tincture from the specimens of opium analysed, but had afterwards exhausted the marc with water, and had then found that the total morphine extracted fell short of what had been proved by analysis ; this meant that extraction with alcohol and water would not extract some of the morphine which was extracted by treatment with lime. But the U.S.P. assay process depended on extraction of the morphine with water, without lime, and it was much used, and had not been shown to be defective. He thought that the authors' belief that some morphine was occluded and remained in the marc would only be justified if they had extracted such morphine from the marc by subsequent treatment by the lime process. He was interested to hear that Mr. Cripps had tested the marc in one case, and found no morphine retained by it. The B.P. process for assaying tincture of opium was notoriously faulty, and he therefore attached more weight to the authors' Table B, in which the errors of the process had been allowed for, than to their Table A. Taking Table B, he pointed out that Nos. 5 and 6, in which a gain of morphine in making the tincture was shown, must be set against Nos. 3 and 4, in which a practically equal loss was noted ; this left only Nos. 1, 2, and 7, and in No. 2 the loss was so small as to be negligible, so that they were practically left with two results, Nos. 1 and 7, to show that a loss of morphine occurred. Whatever process of assay was followed, it was full of possibilities of error, and he thought more than two results were therefore necessary to establish this remarkable loss. The morphine obtained by the lime process was usually not quite pure, and the degree of impurity was variable ; and he suggested that it might be found that the morphine obtained from the opium which had been purified by solution in alcohol, that is, the morphine obtained in assaying the tincture, was as a rule rather purer, and therefore less in quantity, than that from the crude opium. The B.P. method of determining the purity of the morphine by direct titration, using litmus paper as indicator, could not be relied on, better results could be obtained by using tincture of cochineal.

Mr. Cripps said he had found that by far the best indicator to use was iodoeosin.

Mr. Farr, in reply, said of course this was a very complicated subject, and he was afraid that they would not agree on all points. He agreed with the cogency of certain of the remarks which had been made in regard to the matter. With reference to Mr. Har-

rison's remarks, that speaker had stated that if there was any loss they would find it in the marc after; as a matter of fact, he had actually found morphine in the marc. After percolation he was able to obtain a slight amount of morphine by using lime, as in the B.P. process. Even in the case of sample No. 7 there was a distinct proportion of morphine in the marc, but that particular one they had not been able to finish. During the summer six months Mr. Wright and himself were not in a position to devote any time to this work, as they were both engaged in business, and they were only able to do this research work in the winter months. With reference to the indicator he agreed with Mr. Cripps as to the use of iodoeosin.

The PRESIDENT expressed the thanks of the Conference to Messrs. Farr and Wright for their valuable contribution, and expressed the hope that they would find time to prepare another paper on the subject.

EXTRACT OF INDIAN HEMP

BY HAROLD DEANE, B.Sc. (LOND.), F.I.C.

It was pointed out by D. Hooper (*Year-Book*, 1894, 484) that the official extract of Indian hemp is composed of a mixture of a green resin and brown water-soluble extractive matter, and Merson (*P.J.* [4], **14**, 1904, 234) showed that this brown extract was not readily soluble in alcohol, and that commercial extracts varied largely in the proportion of this substance they contain.

The figures in Table I, obtained from the examination of various samples of Indian hemp, indicate the proportions in which the two components may be expected in the extract, although, as the alcoholic extract was obtained by extraction in a Soxhlet apparatus, the yield of water-soluble extract is probably higher than would be obtained by percolation in the cold. Nos. 14, 15, 16, and 17 were Madagascar cannabis, the others were the official drug. It may be noted that the extracts prepared from Madagascar cannabis contain much larger proportions of resin than those from Indian.

Table II shows the results of the examination of samples of commercial extracts. Nos. 1 to 4 were supplied by customers to indicate the quality they were accustomed to buy, No. 5 is from a London hospital, and Nos. 6, 7, and 8 are from retail pharmacists. No. 2 was stated to be from Madagascar cannabis. In

the case of No. 8 the tube containing the extract was broken in transit, and there was insufficient left for a quantitative determination. All had been obtained from houses of the highest reputation.

Although this is by no means an exhaustive series of samples, it fully bears out the numerous criticisms that have been made as to the variability of this extract as supplied by manufacturers. The most noticeable thing, however, is that only two of them, Nos. 1 and 6, can have been prepared according to the direction of the British Pharmacopœia. Now, such a state of affairs is profoundly unsatisfactory, and the question that arises is, shall we urge these firms who are supplying these non-official extracts to return to the paths of the B.P. under pain of penalties under the various Acts provided for that purpose, or shall we suggest to the compilers of the Pharmacopœia that they should alter their process? The latter is the course which I wish to support.

The reason for the predominance of non-official extracts is easily found. The pharmacopœial preparation is unsatisfactory, being composed of two constituents, the resin and the brown extractive, which show a tendency to separate, and, moreover, it is by no means completely soluble in alcohol, which makes the preparation of the tincture troublesome and messy. Therefore a demand has arisen for an extract soluble in alcohol, and there is a very general idea that the B.P. extract ought to be soluble in alcohol—see for example, Dr. Martin's remarks in the *Year-Book* for 1909, page 240.

There is little doubt now that the resinous portion of the extract contains the active principle, and therefore extracts such as Nos. 2, 3, 4, 5, 7, and 8, which are practically pure resin, may be expected to be therapeutically more active as well as pharmaceutically more elegant. To obtain such an extract Merson (*loc. cit.*) suggested the use of absolute alcohol or ether, but these solvents are much more expensive than the industrial alcohol which is now employed, and there is a simple and inexpensive method which yields a product that is all that can be desired. I have not been able to find it mentioned in the literature of the subject, except in a remark by Mr. Dott in the discussion on Mr. Merson's paper, but it is well known to manufacturers, and is no doubt the method by which most of the soluble samples in Table II were made. The method is simply to wash away the brown extractive with warm water, after the spirit has been distilled off, in the same way as resin of jalap and resin of scam-

mony are prepared, and I would urge that this method should be adopted in the Pharmacopœia, so that the present unsatisfactory state of things may be altered.

In addition to making this change in method, I would suggest that some limits as regards insoluble matter and water should be included. Sample No. 4 in Table II, and Nos. 9, 11, and 12 in Table III, show what a large amount of water may be incorporated in the extract, and such quantities are obviously undesirable. The limit should not be placed too low, as volatile oil is also included in the loss on drying which is called "water," and a definite time of heating should be given, as the last portions of volatile matter dissipate very slowly.

The solubility in ether (s.g. 0·720) is a better test of the quality of an extract than its alcohol solubility. Alcohol re-dissolves a considerable portion of the brown extractive (see Nos. 1, 6, and 13), and it is necessary to use a definite amount (I used 20 mils for each gramme of extract) to get uniform results. In the case of a washed extract the portion insoluble in alcohol is in most cases a dark green fatty body. On treating this with ether a dark green oil, probably derived from the seeds, is obtained, leaving a greenish-grey powder behind. This consists partly of a little water-soluble brown matter, which has been left behind in washing, and the remainder dissolves in caustic soda solution and is not re-precipitated therefrom by acids. It is no doubt the result of the action of heat on the brown extract. On microscopic examination I found no trace of cellular débris derived from the drug, which Greenish and Griffiths (*P.J.* [4], **27,** 34) found present in a sample of extract they examined.

Table III shows the results of the examination of various extracts prepared in the laboratories of Messrs. Stafford Allen and Sons. No. 9 was made from Madagascar cannabis and had been partially washed with water. No. 10 represents the same extract after thorough washing and drying. Nos. 11 and 12 had been thoroughly washed, and show what a large proportion of water can be left in. No. 13 had not been washed. Nos. 14 and 15 had been thoroughly washed. No. 16 had not been washed quite thoroughly, and No. 17 is the same extract after washing further and redissolving in alcohol (90 per cent.). No. 18 was prepared by percolating the drug with acetone; the insoluble matter (which was determined by difference) consisted of oil.

The present state of affairs regarding this extract is bad for

the medical man and the patient, owing to the variation in strength, and inconvenient for the wholesale druggist, whose customers order "Ext. Cannab. Ind., P.B.," and frequently expect something quite different and more expensive. This paper, in drawing attention once more to this preparation and suggesting a remedy, will, I hope, assist in bringing about a change.

TABLE I

Proportions of Extract and Resin yielded by Indian Hemp.

	Yield of Alcoholic Extract per cent.	Yield of Resin per cent.	Percentage of Resin in Extract.
1	20·8	14·4	69
2	25·0	15·0	60
3	23·0	15·0	65
4	26·5	16·0	60
5	18·5	12·5	68
6	25·0	14·5	58
7	21·0	9·5	45
8	20·0	12·0	60
9	20·5	12·5	61
10	21·5	13·5	63
11	22·5	14·5	64
12	17·0	10·0	59
13	19·7	10·0	51
14	18·0	14·4	80
15	11·2	10·4	93
16	13·1	12·6	96
17	18·9	14·4	76

Average of Nos. 1 to 13, 56 per cent. of resin in extract.

TABLE II

Examination of Commercial Extracts.

	Soluble in Alcohol 90 per cent.	Insoluble in Alcohol 90 per cent.	Water by Difference.	Insoluble in Ether (0·720 methylated)
	Per cent.	Per cent.	Per cent.	Per cent.
1	86·9	11·7	1·4	33·6
2	98·3	0·45	1·25	—
3	98·65	0·95	0·4	5·6
4	72·25	2·65	25·1	1·65
5	95·3	0·3	4·4	2·25
6	83·9	4·7	11·4	42·0
7	93·3	0·7	6·0	4·45
8	Almost entirely soluble in alcohol and ether.			

TABLE III

Examination of Extracts prepared by Known Processes.

	Soluble in Alcohol 90 per cent.	Insoluble in Alcohol 90 per cent.	Water by Difference.	Insoluble in Ether (0·720 methylated)
	Per cent.	Per cent.	Per cent.	Per cent.
9	67·1	3·8	29·1	—
10	94·4	3·2	2·4	1·2
11	76·0	0·9	23·1	—
12	79·9	1·9	18·2	—
13	86·0	5·2	8·8	36·2
14	98·2	1·3	0·5	1·65
15	98·9	0·35	0·75	1·7
16	95·7	0·4	3·9	8·4
17	96·5	0·3	3·2	0·5
18	61·0	29·0	—	—

DISCUSSION

Mr. THOS. MABEN said they were indebted to Mr. Deane for this excellent paper, and for the amount of work he had put into it. Mr. Deane had remarked that it was generally agreed that the activity of cannabis was due to the resin, but at the Dundee Conference eight or nine years ago Professor Marshall, in a paper on the subject, had stated that the activity was not due to the resin, but to cannabinol. Cannabinol was isolated some years ago, and when preserved in hermetically sealed tubes it retained its activity indefinitely, but as soon as it was exposed to the atmosphere it began to be by some process changed to resin. Since then Professor Marshall had repeated the statement in a paper communicated to *The Pharmaceutical Journal*, and he did not think anybody had disputed his statement. The question was whether there was any advantage in knowing the amount of resin, and he was not sure whether there was any advantage. He observed that Mr. Deane had found that the amount of resin in Madagascar cannabis was greater than in the Indian, but it did not follow that it was more active. It had been found that *Cannabis sativa* grown in different parts of the world produced an extract as effective as that grown in India, and there was therefore no necessity for the B.P. restricting the drug collected in India.

Mr. JOHN C. UMNEY pointed out that a large amount of extract of Indian hemp was used, mixed with collodion and salicylic

acid to form corn solvent, but it was not for him to say whether it had any beneficial effect. When *Cannabis indica* was 4*d.* or 5*d.* per lb. the extract could be made cheaply from it, and used as a corn solvent it was a very useful thing, but when the export tax sent up the price of the extract he questioned whether they were not perpetuating a mistake by putting the extract in the corn solvent; he thought it would be far better to go carefully into the matter and see whether collodion coloured with chlorophyll would not serve the same purpose.

Mr. Wippell Gadd said he was surprised that Mr. Deane had not referred, except incidentally, to the pharmacological tests for cannabis. As chemists had not found a satisfactory chemical process of standardization for this drug it was essential that all cannabis products should be submitted to tests as to their power of producing incoordination of movement in cats and dogs.

Mr. Edmund White considered that the secret of good cannabis extract was that the hemp used should be perfectly fresh. His opinion was that the extract should be made in India, and imported in sealed tubes. He thought that was the only way that it could be used in medicine, as if the extract was made in England from the imported drug it was of little use.

Mr. Dott said the question arose whether cannabis was worth retaining in the Pharmacopœia at all. He thought not as far as its medicinal value was concerned.

Mr. Finnemore said that they were greatly indebted to Mr. Deane for his investigation of the extract of Indian hemp. He thought that the paper and discussion tended to show that there was enormous variation in this medicinal extract, and that the knowledge they had gained was very welcome. The paper opened a nice ethical point as to whether manufacturers should follow the methods specified in the Pharmacopœia, because from the results obtained it was apparent that they did not, and it was an open point whether the Pharmacopœia should restrict manufacturers to the official process. The other side of the question was this—the present Pharmacopœia was very old and out of date, and it was questionable whether manufacturers should be restricted to using a method that was at the present time thirteen years old. Personally he thought they should not be so restricted, but on the other hand the various tests should be included. His experience was that this particular extract was little used by pharmacologists at

the present time. Pharmacologists said that the variations in activity made it a dangerous drug, so that they recommended that it should not be employed.

Mr. E. T. Brewis said that one point occurred, namely, that the extract, which contained quite a moderate amount of watery extract, was extremely liable to separate, and if the pot was put aside, and the extract assayed from the top part of the pot, it might vary considerably.

Mr. Deane, in reply, referred to Mr. Maben's comments, and pointed out that in his paper he simply said that the active principle was contained in the resinous portion of the extract. No doubt the pharmacological test was important, but it was not a quantitative test by any means in this instance. In reply to other remarks, he agreed that the extract varied, and tended to separate into two parts, and in one of the samples after eight months two distinct layers were perceptible—brown at the bottom and green on top, while the water had increased from 8 to 18 per cent. In regard to its inclusion in the Pharmacopœia he had only to say that it was still used.

The thanks of the Conference were passed to Mr. Deane, on the motion of the President.

NOTE ON SPIRIT OF SAL VOLATILE

By E. W. Pollard, B.Sc.

For the preparation of spirit of sal volatile, the Pharmacopœia directs that a mixture of alcohol, water, and essential oils be distilled. One has always noticed that during this distillation the most delicate aroma, and, indeed, the majority of the oil, comes over early in the process. The oils of lemon and nutmeg are for the most part easily volatile in the vapour of alcohol; but hey are also easily volatile in steam, and I was interested to find out the proportion that fractionally distilled in steam.

The B.P. quantities—14·1 c.c. oil of nutmeg and 20·3 c.c. oil of lemon—were placed with a litre of water and distilled, the distillate of 500 c.c. being collected in five fractions. No less than 26 c.c. of the oil distilled in the first 100 c.c., that is, 75·5 per cent. The other four fractions gave: Second, 6 c.c. = 17·5 per cent.; third, 1 c.c. = 2·9 per cent.; fourth, 0·5 c.c. = 1·4 per cent.; fifth, 0·3 c.c. = 0·8 per cent. Total, 33·8 c.c. = 98·3 per cent.

The remaining 1·7 per cent. represents the residue of brownish fixed oil, which always remains in the still whether distilled with alcohol or water.

The aroma is most delicate in the first fractions, the later ones becoming even objectionable. Indeed, with regard to the extra 225 c.c. directed to be collected I must plead guilty to having neglected it for years, considering that it contained nothing but an undesirable smell.

The proportions of oil would vary with different forms of still, but I think the results confirm my opinion that the distillation of the alcohol is merely a waste of time and gas. Moreover, the distillation of alcohol is attended with some risk for the average pharmacist who lacks steam pressure; entailing the consideration of extra fire insurance. When only oil and water are distilled the operation is safe, and small apparatus such as is used for analysis is quite sufficient for a gallon of spirit of sal volatile.

The following process gives, as far as I can discover, a spirit equal in all respects to that prepared by the official process.

Oil of Nutmeg	4½ fl. drachms.
Oil of Lemon	6½ fl. drachms.
Water	2 pints.

Distil 1 pint. Mix with 6 pints of alcohol.

Dissolve ammonium carbonate, 4 oz., in strong solution of ammonia, 8 oz., water, 9 oz., by the aid of gentle heat. Add the solution to the alcoholic solution of oils.

Discussion

Mr. Umney said that in making sal volatile the necessity arose of fixing the aldehyde present in the alcohol, so that the preparation should not become dark in colour. He thought if Mr. Pollard would look back to the suggestions which had been made, he would find that there was always a certain amount of fixed oil in volatile oil of nutmeg, which the proposed tests for a new B.P. would eliminate. In the case of lemon oil there was decomposition of citral, fully recognized by the preparation of this oil at all times by expression of the oil from the rind of the fruit.

Mr. J. Rutherford Hill said it was a matter for consideration whether distillation was necessary at all. He had had experience of hospital practice, where cost was an important

consideration, and in which simple solution of the ammonium carbonate and essential oils in alcohol and water gave a product which answered all purposes satisfactorily. An alcohol which would stand the ammonia test could be obtained commercially, and if oils of good quality were employed the product differed very little from that prepared by distillation. The suggestion made by Mr. Umney as to oil of nutmeg would help in this direction. It might be that when sold by itself a distilled product was desirable, but certainly when prescribed in mixtures the undistilled article was perfectly satisfactory. This would enable the pharmacist to make his own spirit of sal volatile, and that was the ideal arrangement.

Mr. R. A. Cripps could not agree with Mr. Rutherford Hill that distillation is unnecessary; the aroma of the spirit is improved by removal of the higher fractions of the oil. Moreover, it was desirable to distil the rectified spirit with a small amount of ammonia in order to *ensure* that the resulting sal volatile should not discolour. The discolouration is commonly due to the presence of quercitrin, derived from the wood of the casks in which the spirit was stored. It was a matter of little importance whether the oils were distilled with the spirit or with water, as suggested by Mr. Pollard.

Mr. Pollard, in replying to the points raised, agreed that there certainly was a difference in aroma between sal volatile made by distillation and by simple solution. As to the colouration, he did not know what spirit had been used; no doubt the point was often raised, and he had frequently heard complaints of the sal volatile being coloured. It might, he thought, be remedied by the use of tap-water, the chalk in tap-water might help to fix the aldehyde.

The President voiced the thanks of the Conference to Mr. Pollard for his interesting communication.

A SUGGESTED STANDARD FOR THYROIDEUM SICCUM

By Reginald R. Bennett, B.Sc. (Lond.), F.I.C.

There is a widespread belief among clinicians that the commercial thyroid preparations vary considerably in their degree of physiological activity, but at the present time there is no officially recognized standardization process. In the British Pharmacopœia a process is described for the preparation of Thyroideum Siccum from the fresh glands of the sheep, but

there are no details of any test which the pharmacist can apply in order to assure himself of the genuineness and activity of a powder which he has not prepared in his own laboratory. The British Pharmaceutical Codex orders that dry thyroid should yield not more than 6 per cent. of ash on incineration, and also describes a qualitative test, similar to that given in the United States Pharmacopœia, for determining the presence of iodine in organic combination, but there is no quantitative specification.

The agreement among the majority of pharmacologists that the activity of thyroid is directly proportional and dependent upon the combined iodine present, appears to render it urgently desirable that an iodine standard should be fixed, especially in view of the wide variations in the iodine content of commercial samples of Thyroideum Siccum.

Specimens of Thyroideum Siccum from four of the leading manufacturers have been examined recently, and the combined iodine present has been found to vary in amount from 0·315 per cent. to 0·038 per cent. The actual figures, representing the mean of several determinations, obtained for the four samples are 0·315 per cent., 0·220 per cent., 0·122 per cent., and 0·038 per cent. Another dry thyroid preparation, supplied only in tablet form, is stated by the manufacturers to be standardized to contain 0·2 per cent. of combined iodine, and this figure has been confirmed.

The percentage of iodine in dry thyroid prepared from a series of sheep's thyroids obtained direct from the slaughter-house has also been determined, the glands having been treated in accordance with the directions in the British Pharmacopœia. The iodine present in these powders has been found to vary from 0·21 per cent. to 0·096 per cent., the actual figures for fifteen determinations being 0·210, 0·192, 0·190, 0·178, 0·175, 0·174, 0·161, 0·160, 0·155, 0·149, 0·148, 0·146, 0·130, 0·115, and 0·096—an average value of 0·158 per cent. These glands were obtained from sheep slaughtered in April, Koch having stated (*Proceedings American Pharmaceutical Association*, 1907, Vol. 55, p. 371) that the percentage of iodine in unadulterated desiccated sheep thyroids prepared during the winter months is three times higher than when prepared during June and July, and that the percentage of iodine gradually diminishes towards the summer months, and then again gradually increases towards the winter.

The figures given above confirm those obtained by Swinton

(*P.J.* [4], **7**, 482), who reports a mean of 0·03 per cent. of iodine in fresh glands, which is equivalent to 0·15 per cent. in dry thyroid, one part of which is usually equivalent to 5 parts of the fresh gland. Hunt and Seidell (No. 47 "Hygienic Laboratory Bulletin of the Public Health and Marine Hospital Service," Washington) give eighteen iodine values for sheep's thyroid, which vary from 0·320 per cent. to 0·084 per cent., the mean being 0·1576 per cent. These figures all indicate that an iodine standard of 0·15 per cent. might be adopted for Thyroideum Siccum without in any way unduly harassing the manufacturer.

In this investigation the iodine has been determined by mixing 5 Gm. of the dry thyroid with 8 Gm. of powdered sodium hydroxide, and fusing in an iron crucible until carbonized, when another 2 Gm. of powdered sodium hydroxide was added, and then 2 Gm. of potassium nitrate in order to oxidize the carbon completely. The fusion was conducted throughout at a dull red heat, and during the addition of the potassium nitrate the fused mass was stirred with a steel spatula in order to facilitate the oxidation. The fused mass, when cool, was extracted with water and filtered into a stoppered flask, the greater part of the alkali was neutralized with sulphuric acid, then 15 mils of carbon disulphide was added, and the liquid finally made acid with sulphuric acid. Since a portion of the potassium nitrate is reduced to nitrite during the fusion, the nitrous acid formed will decompose the iodide present with the liberation of iodine, but 2 Gm. of sodium nitrite should be added in addition to ensure excess of nitrous acid. The contents of the flask were well shaken in order to dissolve the liberated iodine in the carbon disulphide, and the liquid then poured upon a moistened filter. The filtrate was shaken with another 10 mils of disulphide, in order to remove the last traces of iodine, and again filtered. The two quantities of disulphide were washed free from acid, a hole was made in the filter papers, and the disulphide containing the iodine in solution allowed to run into a small stoppered bottle, a small quantity of sodium bicarbonate added, and then titrated with centinormal sodium thiosulphate solution, shaking vigorously after each addition of thiosulphate until the violet colour of the iodine was completely discharged. This method is substantially the same as that originally devised by Baumann, and, with care, will give concordant results. Titration of the disulphide solution with thiosulphate is recommended in preference to colourimetric comparison with standard solution of

potassium iodide, as being more convenient, unless a long series of experiments is to be made.

Riggs suggests (*Journal of the American Chemical Society*, Vol. 31, p. 710) that during the fusion with potassium nitrate a variable amount of iodate is formed and low results are obtained, unless the iodate is reduced ; but Seidell (*Journal of the American Chemical Society*, Vol. 31, p. 1326) asserts that there is no appreciable loss of iodine that can be ascribed to the formation of iodate. Stanton (*P.J.* [4], **7,** 546) criticizes the use of potassium nitrate in the estimation of minute traces of iodine, but in the series of determinations now reported no loss of iodine has been observed.

Discussion

Mr. C. E. Stuart, B.Sc., in a letter which was read by Mr. Finnemore, agreed with the author that Dr. Reid Hunt's published work furnished strong evidence that the iodine percentage of the thyroid gland was a measure of its pharmacological value. He thought that it might ultimately prove desirable that a standard of percentage of iodine in Thyroideum Siccum should be agreed upon. But at the present time he did not think they had sufficient data to enable this to be fairly fixed. His experience in the manufacture of thyroid preparations since 1891 led him to the conclusion that the standard suggested by Mr. Bennett was too low. Analyses of Thyroideum Siccum from a large number of thyroid glands in the laboratories of Brady and Martin, Limited, had given an average of well over 0·3 per cent. of iodine. The percentage in a bulked lot of Thyroideum Siccum from 2,500 glands collected during May and June, 1911, was 0·35 per cent. The percentage in Thyroideum Siccum from 300 glands collected in the second week of July, 1911, was 0·38 per cent. From that he suggested that when a standard was fixed it should be a minimum of 0·25 per cent. of iodine. But before this was done, he thought they should have more figures before them ; first, a series from different parts of the country, as local variations in pasturage, proximity to the sea, and possibly also breed of sheep, might affect the average of iodine percentage ; secondly, a series of figures for different months of the year. Although his analyses had chiefly been made in the first half of the year, and showed no such fall in April and the summer months as mentioned by Koch, yet complete series of figures

for the year from different sources should, he thought, be before them. With regard to the method of estimating the iodine, he thought the process used by Mr. Bennett was very liable to give low results, as the addition of nitrate of potash and the carrying of the ignition to complete combustion of the carbon was liable to cause a loss of iodine. The process adopted in his laboratory was substantially as follows :—One Gm. of the dried gland was mixed with 10 c.c. of Lig. Potassæ in a nickel vessel, and the whole evaporated to dryness on a sand bath. This process gave complete saturation, almost solution, in the alkali, and no spurting. The dried mass was ignited until completely charred, then washed through a filter, and made up to 50 c.c., and the iodine estimated by Standford's method, as suggested in the *Year-Book of Pharmacy*, 1883, page 330, or by any usual method.

Mr. F. W. Gamble said that the differences in iodine content in Thyroideum Siccum, suggested in Mr. Stuart's letter as due to possible seasonal variations or the nature of the grazing ground, certainly pointed to the desirability of a standard being fixed. There was also another point from which the question might be approached, and that was whether the percentage of iodine in the finished powder should not approximate to the normal percentage in fresh thyroid gland, rather than conform with an artificial standard for the concentrated pharmacopœial preparation. He believed that had already been done by one or two manufacturers. There were three descriptions of thyroid on the market : the B.P., freed from fat ; a crude dried powder not freed from fat ; and a powder equivalent in strength to fresh thyroid gland. The average strength of the latter is correctly stated in Mr. Bennett's paper as 0·03 per cent. ; and it is a question whether the standardized preparation should not be diluted to contain this amount of iodine, and thus represent the fresh substance in strength.

Mr. Harrison said that papers of this kind were to be heartily welcomed, as helping towards greater uniformity in strength ; but he rather demurred to Mr. Gamble's suggestion that a standard for iodine content of thyroid should be introduced into the next Pharmacopœia. It had been shown that there was more than one organic iodine compound in the gland, but it had not been shown, so far as he knew, that they were of equal value, or which was the really active one ; and therefore a fixed iodine content would in itself be no guarantee of activity. The

active compound might be decomposed by treatment to which the gland was subjected, and yet iodine in organic combination might be present in full quantity. It would also be possible to "fortify" a valueless preparation by adding some organic iodine compound.

Mr. Maben pointed out that there were several other factors which were now said to affect the activity of the gland, in addition to those mentioned by Mr. Bennett and Mr. Gamble. For example, whether the glands were taken from rams, wethers or ewes. He was wondering whether Mr. Bennett had taken any steps to find out information in that direction. He did not know any sound authority for saying that the activity of thyroid was due entirely to iodine value. The question has recently arisen as to whether the phosphorus contained in the nucleo-proteid of the parathyroid substance played any part in the activity.

Mr. Reginald R. Bennett, in replying, said that he considered a standard of 0·3 per cent. of combined iodine, as suggested in the letter read by Mr. Finnemore, was too high, and would rule out most of the commercial samples of dried thyroid. Several modifications of Baumann's assay process had been tried, but the process, as detailed in the paper, had given the most consistent results. In reply to Mr. Maben, the thyroids obtained from the slaughter house were those of full-grown sheep, but the pasturage had not been determined.

The following paper was read by Mr. Horace Finnemore in the absence of the author :—

LINIMENTUM AMMONIÆ

By F. H. Alcock

My attention was directed to this preparation by a Birmingham firm of pharmacists who had a 40 oz. N.M. stoppered bottle two-thirds full of it, and it had gone quite solid and could not be removed from the bottle. It had been in the bottle "some months." They also handed to me a wholesaler's sample which had become solid, and on the label was "Shake the bottle," which seemed out of place, and "24. ii. 09" told its age. There was no doubt about the high standing of the firm which had supplied this, and by tests it seemed to be correctly made. My friends assured me that the reason they had bought from the wholesaler was to find out whether it could be made of permanent

fluidity. The time at which in their experience this solidification takes place varies between several weeks and several months. Attempts were made to try and "thin" the mass, but without success; amongst the devices used were heat, cold, dilution with water, glycerin, alcohol, turpentine, benzene, amylic alcohol, petrol, chloroform, ether, acetic ether, in reasonable quantities. Both glycerin and water were found to make the mass thicker and very clotty, and I gave up further attempts to promote fluidity and made experiments to try and prevent solidification.

This liniment has been made with all sorts of oils besides olive, such seed oils as linseed, poppy, cotton, almond, and sesame having been suggested. In some formulæ spirit and oleic acid find a place (U.S.P.), and this perhaps on the suggestion of Caspari, who says, "cotton-seed oil of the market does not seem to be well adapted for the preparation of liniment of ammonia, separation into two distinct layers invariably occurring. If some common olive oil be used then the oleic acid present in it assists the process."

The use of oleic acid in place of oils was suggested by Professor Tichborne many years ago at one of the London B.P.C. meetings (1874), his formula being oleic acid ʒss., water, ʒij., strong solution of ammonia, ʒiss., and in the discussion which followed reference was made to the pectizing oleate, which I take to mean this property of solidification. Of this preparation under discussion Mr. J. W. England (*Year-Book*, 1888, page 208) says that the soap is not in solution but suspension, and that sooner or later the liniments are liable to caking, solidification, or partial separation, and advocated their extemporaneous preparation when wanted, and this suggestion the U.S.P. also acts upon. In order to get a permanently fluid preparation on the basis of the official British Pharmacopœia formula and in place of the water used to dilute the stronger solution of ammonia in making the weaker or 10 per cent. solution, glycerin was tried, and so was alcohol. Emulsification resulted, and so did separation, and in the end it was found that the best results were obtained by leaving out as much of the water as possible; the formula to read thus:—

Almond oil	3 fl. oz.
Olive oil	8 fl. oz.
Strong solution of ammonia (0·880) . . .	1 fl. oz.

The product is not so elegant as the fresh official preparation, but it is very effectual. I do not know why the expensive

almond oil was introduced into the formula, and I think that the olive oil alone may be used with my suggested formula, which would thus read—Olive oil, 11 fl. oz., and strong solution of ammonia, 1 fl. oz. It would still require a "Shake the bottle" label.

Discussion

Mr. E. W. Pollard said that theoretically Linimentum Ammoniæ was nearly a perfect preparation. From the photomicrograph he published in the *Year-Book*, 1900, it was seen that the globules were very regular. He believed the viscosity was due to the large proportion of soap formed if acid oils are used. He thought the percentage of aqueous matter in the suggested formula was much too low.

Mr. W. A. H. Naylor agreed with Mr. Alcock as to the acidity of the oil, but if the author had been present it would have been interesting to hear further information on one or two points. He would like to have heard how long the liniment had been kept, as after considerable storage the oil was liable to solidify.

The thanks of the Conference were passed to the author for his paper.

The following communication was read by Mr. E. T. Brewis :—

THE MOISTURE AND ASH CONTENTS OF MEDICINAL EXTRACTS

By Kenneth C. Allen and Theodore Brewis, F.I.C.

Our object in drawing attention in this short note to a matter which has, we feel, been to some extent overlooked, is a desire to elicit the opinions and experiences of other workers in this field.

A search through recent pharmaceutical literature fails to supply any definite figures for the moisture and ash contents of solid extracts. The official requirements of the B.P., 1885, were vague, even to the extent of ordering the evaporation of extracts "to a suitable consistence," and although the instructions of the present 1898 Pharmacopœia are somewhat more explicit, we still find such directions as "to the consistence of a soft or a firm extract," or to "dryness," terms which admit of wide interpretation.

The phrase "to a pilular consistence," which is used in some of the monographs of the U.S.P., is open to the same criticism.

The P.G.V., 1910, in general directions applying to solid extracts, divides them into three classes, viz. :—

1. Thin (*dunne*) : Having a fluidity equal to that of fresh honey.

2. Thick (*dicke*) : Non-pourable when cold.

3. Dry (*trockene*) : Dry enough to powder.

Formulæ also are given for the production of diluted narcotic extracts (1 + 1) in both liquid and powder forms.

The French Codex, 1908, distinguishes four kinds of extracts, viz. :—

1. Fluid : Prepared by percolation, and equivalent, weight for weight, to the powdered air-dry drug from which it is made.

2. Soft (*mous*) : Having a consistence of thick honey.

3. Firm (*fermes*) : Do not run when cold, and when dried at 110°C. lose from 15 per cent. to 20 per cent. in weight.

4. Dry (*secs*) : Which are easily powdered.

The want of more precise directions in the pharmacopœias leads from time to time to uncertainties with regard to the physical condition of the extracts, and we need only cite the case of Ext. Belladonnæ Alc. as an illustration of this point.

We, of course, recognize that the more potent extracts must be standardized on a potency basis by chemical or physiological methods. Such extracts are best presented in the form of dry powders, which can be easily weighed with the accuracy necessary for apportioning the small doses in which they are usually prescribed.

Farr and Wright have ably set forth the many advantages of the powdered crude drugs suggested by them as diluents, and we recommend their employment, provided they are finely powdered, so that the particles present the greatest possible surface in proportion to the weight required for standardizing the extract.

In the case of extracts which are standardized on the basis of the weight of crude drug taken for their production, such as Ext. Cascara, and others in the U.S. Pharmacopœia, we are of the opinion that this procedure is open to criticism, as it makes no allowance for the varying yields of extractive in parcels of drugs obtainable from one time to another, and we consider it better to base a standard on the weight of really dry extractive actually obtained.

For the rest, soft extracts, gentian, taraxacum, and the like, or dry extracts, such as aloes and cascara, definite limits of

moisture should be prescribed, and we believe that this would be found not only advantageous to the user, but also easily attained in practice by the manufacturer.

To illustrate the points in this short note, and perhaps to help to fill a gap in pharmaceutical literature, we append figures for moisture and ash obtained on a series of pharmaceutical solid extracts.

Extract.	Per cent, Moisture Dried, 100°–105°,	Per cent. Ash,
Aloes Barb.	6·74	1·63
Aloes Barb., Pulv.	6·6	—
Anthemidis	33·9	9·92
Belladonnæ Alc.	23·7	3·01
Belladonnæ Virid.	28·3	15·05
Cannabis Ind.	10·5	0·24
Cascaræ Sagradæ.	13·32	5·54
Cascaræ Sagradæ, Pulv.	11·23	—
Colchici	33·1	8·59
Colocynth. Co.	14·81	4·97
Colocynth. Co., Pulv.	7·55	—
Ergotæ	22·5	14·55
Euonymi Sicc.	7·4	27·8
Gentianæ	27·1	4·22
Glycyrrhizæ	33·54	6·35
Hyoscyami Virid.	25·89	17·57
Jalapæ	25·58	1·83
Krameriæ	10·34	3·29
Krameriæ, Pulv.	7·46	—
Nucis Vom.	22·13	2·69
Opii	22·16	3·6
Physostigmatis	9·51	1·27
Rhei	13·64	5·78
Rhei, Pulv	11·41	—
Stramonii	22·13	8·93
Strophanthi	4·89	0·08
Taraxaci	29·05	6·24

Discussion

Mr. F. Ransom, called upon by the President, thought the Conference was much indebted to the authors of this paper for bringing the matter before them. No doubt the percentage of water varied very much in these liquid extracts. He had no intention of going into the paper in detail, but said that in his experience the green extracts do contain as much as 25 to 30 per cent. of water. In regard to Extract Cannabis Indica, he noted that on one occasion a sample of extract of Cannabis

Indica contained only 5 per cent. water, which was no doubt due to the amount of fixed oil present. He thought that if any standard were introduced it would have to be within wide limits, because of the climatic conditions prevailing in various parts of the Empire. They must remember that the Pharmacopœia was an Imperial Pharmacopœia, and it would, in some cases, be necessary to stiffen the extracts before exportation. He hoped that the authors would continue their investigation.

Mr. E. H. Farr said he had not gone into the question very deeply, and had no figures by him, but the amount of water present in extracts would show a considerable variation according to the different situations and the different times of the year. Some of the extracts were especially soft by the seaside; they might be quite firm when made, but would become almost pourable afterwards. That, of course, was one reason why powdered extracts presented an advantage over the ordinary extract, because they might be stored in stoppered bottles, which was not the case with the ordinary solid extract.

Mr. Umney said that the question of the amount of extractive had been considered by the Committee of Reference, and they came to the conclusion that it would be inadvisable to fix a standard for the Pharmacopœia, because it would then be used as a standard under the Sale of Food and Drugs Act. The value of this paper would be much appreciated by manufacturers, who were always glad of standards for their guidance, but from the point of view of the safety of the average pharmacist it would be unwise to fix a definite standard for the Pharmacopœia.

Mr. F. J. Kirby said that in his opinion powdered extracts were not easy to store in the condition in which they were sent out by the wholesalers, but the same might also be said of ordinary extracts, which, if not sufficiently evaporated, were liable to fermentation—indeed, the whole question was not free from difficulty.

Mr. E. T. Brewis, in reply to Mr. Ransom, said that he had also found that Cannabis Indica varied in consistency even after making allowance for the watery content. He quite agreed with Mr. Ransom's suggestion, that if any standards were to be fixed they should be quite wide standards. They would notice that in the French Pharmacopœia, when a standard was given it was as wide as 15 to 20 per cent. His main plea in bringing this matter forward was because, so far as he knew, nothing had been published on the subject, and almost any standard

was better than vague statements. In regard to Mr. Farr's remarks as to the variation of the moisture, he quite agreed with them, and thought that the variation depended largely on the ash; if, for example, they considered the green extract of hyoscyamus, which had 17 per cent. of ash in it, and which had been shown to be potassium chloride, and if they considered that, he thought it would explain Mr. Farr's point. In regard to the dry extract, there was a great deal more work to be done on the subject; what they wanted was to get active dry extracts which would remain in good condition. In reply to Mr. Umney, he had no doubt that the Committee of Reference had come to the conclusion they had arrived at for a very good reason, but his object in bringing forward these figures was that they might be available for manufacturers. In reply to Mr. Kirby, who raised the question of fermentation, he said that these extracts ought not to ferment, and he thought that it was perhaps due to the loose pharmaceutical phrasing in the Pharmacopœia that some of the extracts had been made too soft.

On the motion of the PRESIDENT, a cordial vote of thanks was accorded to the authors of this paper.

NOTE ON ARSENATES OF STRYCHNINE

By D. B. DOTT, F.R.S.E.

The salt $B_2 \cdot H_3AsO_4$ seems to exist, but it is sparingly soluble and apparently partly decomposed in presence of water. There are, however, two well-defined salts, both fairly soluble in water. In the first place we have the generally recognized acid salt $B \cdot H_3AsO_4 \cdot 2H_2O$. The water is not wholly lost in the water-bath, but the salt is anhydrous at 120°C., probably three-quarters of the water is driven off under 100° and the remainder at the higher temperature. The solubility in water at ordinary temperature was found to be 1 in 34. The second acid salt does not appear to be so generally known. It has the composition $B \cdot (H_3AsO_4)_2 \cdot H_2O$, and is soluble in $16\frac{3}{4}$ parts of water at ordinary temperature. This tendency to form extra-acid salts like "quadroxalate" of potash is exhibited in other alkaloids, notably in the case of quinine. Though it has the advantage of greater solubility, the proportion of strychnine is, of course, much less.

NOTE ON STRYCHNINE HYPOPHOSPHITE

By D. B. Dott, F.R.S.E.

The ordinary books of reference do not describe the hypophosphite of strychnine. It crystallizes with the composition indicated by $B{\cdot}H_3PO_2{\cdot}3H_2O$, all the water of crystallisation being lost at 100°C. It is one of the most soluble of the strychnine salts, being dissolved by 3·3 parts of water at ordinary temperature.

Mr. E. F. Harrison asked what were the conditions which determined the formation of one or other of these arsenates.

Mr. Dott replied that he considered it was simply due to the proportion of acid used.

NOTE ON SPIRIT OF NITROUS ETHER

By D. B. Dott, F.R.S.E.

It would be tedious to recapitulate even in a brief form all that has been written on the deterioration of spirit of nitrous ether. The liability to deterioration is officially recognized by permitting a variation in strength of from 2·6 to 1·75 per cent. of ethyl nitrite, but even the lower figure does not prevent frequent prosecutions for the sale of a spirit under the minimum strength. The loss occurs almost entirely by volatilization of the ethyl nitrite, which loss, under the practical conditions of dispensing it is difficult to avoid. In a former paper I suggested the mixing of a strong aqueous solution of sodium nitrite with alcohol containing an equivalent of sulphuric acid, filtering off the sulphate of soda, and washing with alcohol to the proper volume. This method may be useful for preparing a small quantity as required, but it occupies some little time, and the considerable amount of alcohol retained by the sulphate is also an objection. What I now propose is that no spirit of nitrous ether should be kept in stock at all. There would be two solutions, like Fehling No. 1 and No. 2, which would be mixed when dispensing, using ½ fluid drachm nitrite solution with 7½ fluid drachms of acidified alcohol, to make 1 fluid ounce of spirit of nitrous ether. In order to avoid the formation of a precipitate, it is necessary to use an acid which forms a sodium salt soluble in alcohol, and obviously the sodium salt should not have any marked medicinal action in small doses. Further, the acid

should not react appreciably with the alcohol, so that a bottle of the acidified spirit could be kept for a reasonable time. I suggest lactic acid as meeting all the requirements, but there may be a better. It seems to me that this plan of making the preparation at the moment of sale is the only practical way of overcoming what is undoubtedly a serious difficulty. I need scarcely say that the proposal is only made in view of the forthcoming Pharmacopœia, and that the spirit so prepared would require to be approved and passed by the Pharmacopœia Committee.

Discussion

Mr. E. Saville Peck, before expressing a definite opinion on the subject, asked if the formation of ethyl nitrite was immediate on mixing the two solutions, and if any series of experiments had been made to prove whether the mixture was as permanent as the B.P. spirit of nitrous ether.

Mr. Farr remarked that he could not agree with the author if his suggestion was that the modified preparation were intended to take the place of the B.P. spirit of nitrous ether, but if it were suggested that it should replace Liquor Ethyl Nitritis, then he was quite prepared to agree with it. As far as his experience went, the spirit was often taken as a sudorific, and the aldehyde contained in the B.P. preparation must not be looked upon as a negligible quantity.

Mr. Umney said that Mr. Farr had mentioned the point he was going to draw attention to. A suggestion had been made by the Chemists' Defence Association, in view of the prosecutions which had taken place, that it would be well to omit the synonym from the B.P., because the B.P. preparation did not represent the old sweet spirit of nitre. The Committee of Reference had under consideration the suggestion of the Chemists' Defence Association that the bottom limit of spirit of nitre should be lowered. It was a reasonable suggestion, as there was no doubt that many of these prosecutions had been misunderstood by the public because of the reports in local papers. The Committee of Reference was now consulting with the General Medical Council with a view to seeing whether this might not be done, and also whether the synonym might be omitted.

Mr. Rutherford Hill said he agreed with what had been said by Mr. Farr. They were dealing here with two quite different preparations. In his experience many samples of sweet

spirit of nitre which would be condemned on their ethyl nitrite content were, nevertheless, quite satisfactory for the purposes for which sweet spirit of nitre was commonly used. What was commonly known as sweet spirit of nitre was not merely a solution of ethyl nitrite, but a complex mixture of various bodies obtained under the conditions of a special process. It was on this mixture that the reputation of sweet spirit of nitre was founded, and he thought the suggestion of Mr. Umney furnished the most likely way out of the difficulties in connexion with the sale of sweet spirit of nitre. At the same time, a good deal of research had been made as to the physiological action of ethyl nitrite, and this definite action was undoubtedly what was desired by medical practitioners in many cases. Mr. Dott's suggestion did not furnish a substitute for the official sweet spirit of nitre, but would be a very easy and satisfactory way of producing extemporaneously a definite solution of ethyl nitrite that would meet the requirements of a medical practitioner.

Mr. Finnemore asked whether the lactic acid had any influence on the rate of hydrolysis of the ethyl nitrite.

Mr. Pollard said that all were liable to the visits of food and drugs inspectors in connexion with this drug, but he said that a friend of his had found a very convenient method was to make his spirit of nitre four times B.P. strength, and then diluted it as required. Of course, he kept a nitrometer handy. Mr. Pollard said he intended to use this method himself.

Mr. Harrison pointed out that possibly Mr. Pollard would find himself in difficulties with regard to the constituents of Spiritus Ætheris Nitrosi other than ethyl nitrite. He would remind the meeting that a preparation was sold under the name Spirit. Nitri Dulcis, and this preparation was one which was wanted. He thought that the name sweet spirit of nitre should be omitted from the B.P., and it could then be applied to this preparation alone.

In his reply Mr. Dott said that the reaction between the acid and nitrite was fairly rapid, as was evident by the odour developed, and by the fact that a separation of ester soon took place when the solution was shaken up with calcium chloride solution. The preparation was possibly not so permanent as the official spirit, but it was sufficiently so, and could, of course, be made with a stronger alcohol if necessary. Mr. Dott had doubts of the superior merits of the official spirit, thinking it improbable that the very small amounts of paraldehyde, etc.,

could have important physiological effects. In any case the official spirit should be retained only as a domestic remedy, and no ethyl nitrite standard be insisted on. He did not approve of the proposal to still further reduce the minimum.

The PRESIDENT, in thanking Mr. Dott for his papers, referred to the fact that the paper on spirit of nitrous ether dealt with a question which often raised difficulties.

NOTE ON SOLUTION OF SODIUM ETHYLATE

By H. FINNEMORE

Solution of sodium ethylate is used in medicine as a caustic to a somewhat limited extent. According to the official description, it is a colourless liquid, becoming brown by keeping. As it is only employed occasionally, it usually happens that when required the stock is dark brown in colour, and although its medicinal properties are not affected by this colouration, yet the preparation is then unsightly, and the user is apt to assume that deterioration has accompanied this change.

This change of colour is due to the action of the alkali on the acetaldehyde, which may be shown to be always present in small quantity in commercial absolute alcohol.

Various methods were tried to get rid of this impurity, and the most successful was found to be that of Hewitt, who used sodium phenyl hydrazine sulphonate to remove the objectionable aldehydic constituents of whisky (*J.S.C.I.*, **21**, 96).

The alcohol was boiled for one hour with the reagent mentioned, and distilled. The distillate contained no aldehyde, but when kept for some time aldehyde gradually reformed, and the solution of sodium ethylate made therefrom became discoloured.

In using sodium ethylate for its hydrolytic effect in experiments on another subject the writer observed the great depth of colour of the resulting solution when this was used as compared with the absence of colour when sodium methylate was employed. The use of methyl alcohol in place of ethyl alcohol in such a caustic solution was therefore suggested, and a sample of solution of sodium methylate, using Kahlbaum's No. 1 methyl alcohol, shows no trace of discolouration after two years.

DISCUSSION

Mr. NAYLOR inquired whether oxidation took place when

methyl alcohol was used as when ethyl alcohol was used, or was Mr. Finnemore's improvement suggested to overcome the unsightly appearance which was sometimes noticed in solution of sodium ethylate.

Mr. Peck thanked Mr. Finnemore for the interesting note he had read, and asked whether it was not a fact that the use of this preparation was almost entirely superseded by solid carbon dioxide as a strong caustic.

Mr. R. L. Whigham said he would specially like to thank Mr. Finnemore for his note, because as a practising pharmacist having to supply solution of sodium ethylate, he had experienced the difficulty of having the preparation returned because it was of a bad colour. There existed a prejudice against the coloured preparation, and he would like to know whether it had the same pharmacological action as the colourless solution. If Mr. Finnemore had overcome the difficulty by using methyl alcohol the retail chemist would welcome his suggestion.

Mr. Harrison supposed Mr. Finnemore had satisfied himself that the action of the sodium methylate was practically identical with that of sodium ethylate.

Mr. A. R. Smith asked if it was the author's habit to keep the solution of sodium ethylate for two years, seeing that it was so easy to prepare.

Mr. Brewis inquired whether Mr. Finnemore had prepared a solution of potassium methylate, and also, although it did not arise directly out of the paper, whether a solution of potassium in methyl alcohol could be used instead of the ordinary alcoholic solution of potash. The difficulty in regard to the use of ethyl alcohol was the question of the colour of the solution. Had the author observed whether this also took place with methyl alcohol.

Mr. Finnemore, in reply to Mr. Naylor's question, said that the oxidation with the methyl alcohol preparation was quite distinct from that which took place in the ethyl alcohol preparation. When ethyl alcohol oxidizes the product becomes dark brown under the influence of alkalies. There was little doubt that oxidation also took place in methyl alcohol, but without the darkening in colour. In reply to Mr. Peck, it was quite true that the use of the sodium ethylate solution was being largely replaced by that of solid carbon dioxide, but he thought the solution was still being used. In reference to Mr. Whigham's inquiry, the ordinary medical man's idea was that darkening in colour denoted deterioration, and that would account

for the return of the coloured preparation in the instance to which Mr. Whigham had alluded. But it was not really bad, and it was to avoid that difficulty that he had brought this note forward. Mr. Harrison had asked if the action of the methyl compound was identical with that of the ethyl. From the experiments he had had conducted he could answer that question in the affirmative. Mr. Smith had not quite appreciated his point. Of course, he had only kept it for two years to make certain that there was no darkening in colour. In reply to Mr. Brewis, he might say that methyl alcohol could be used in preparing alcoholic potash solution, but it was too expensive.

Mr. Finnemore was heartily thanked for his paper.

Mr. F. Ransom read the following paper in the absence of Mr. Henderson :—

AN EXPERIMENT IN PEPPERMINT CULTURE

By H. John Henderson, Ph.C.

The idea of growing peppermint in the shade had origin in a statement in Sawyer's "Odorographia," to the effect that Mr. Burnett in 1816 first distilled peppermint oil in the County of Wayne, from plants which he found and gathered on the banks of a little stream. He gathered sufficient wild plants to produce 40 lb. of oil. Although no information is given as to the amount of herb Mr. Burnett gathered to produce this quantity of oil, yet peppermint must either have been growing very freely by the banks of that stream, or the plants must have contained an unusual percentage of oil. The percentage of volatile oil contained in peppermint is an elusive factor, which varies considerably according to the condition of the herb after it is cut, and in practice this condition depends upon the climatic conditions of the moment. It is this fact which is responsible for the statement that the drying of the plant in the sun does not result in loss of oil. The herb, as brought to the still, contains a variable amount of moisture, and, when it is remembered that peppermint contains about 85 per cent. of moisture before it is cut, there is room for variation in the observed yield. It is for this reason that the personal opinion is held that yield of oil per acre is the only factor worthy of consideration in a commercial aspect, the percentage of oil yielded by the plants having an academic interest only. Schimmel found the fresh herb to yield 0·3 per cent., and the dry 1·25 per cent., whilst W. Ransom & Son have

found the fresh herb to yield from about 0·2 per cent. to 0·4 per cent. This practice of allowing the plant to lie on the ground to dry somewhat before distilling is said to improve the oil. The variation in flavour and bouquet probably differ to about the same extent as Pasteur's wines. The statement appears to be equivalent to saying that peppermint oil could be improved in quality by exposing it in shallow saucers to sunlight, whilst the old fashion is to store it in a cool cellar in a dark-blue bottle, and these old fashions have often been found to contain much sound science. If the yields given above bear any relation to the enterprise of Mr. Burnett, assuming that his herb contained 0·3 per cent., he would have gathered six tons, he must therefore either have been a gentleman of perseverance, or he possessed a still of some size.

The only piece of ground available for growing the peppermint was a small piece on the bank of the stream which bounds the herb garden of W. Ransom & Son, at Hitchin. This was well dug and manured with long stable manure, and special roots were obtained for change of stock. The day before the roots were delivered a heavy fall of snow took place, succeeded by a hard frost. On their arrival nothing could be done with them for four days except to store them in a cellar pending developments. Fortunately, a rapid thaw set in, and, when the snow had disappeared, the roots were planted out. The ground was in the worst possible condition, and it was feared that this, coupled with the long delay, might prove disastrous to the plants. These fears were groundless, for the plants grew and flourished exceedingly, some of them reaching a height of 50 in., the average height being 3½ ft. The stems were stout, and the leaves correspondingly large. A plant was submitted to Mr. E. M. Holmes for comparison with a plant of the ordinary black variety of W. Ransom's stock. This was done to ensure against the introduction of any strange and worthless variety. Mr. Holmes said : " Except that the one plant is larger and more robust than the other, I see no difference. Both have the purplish tint on the stems and midribs and margins of the leaves, but the more robust one less in degree."

On September 2, 1909, this mint was cut and distilled before it had flowered. The reason for the non-appearance of the flowers may have been due to lack of sunlight, for the same plants flowered freely in 1910 in a sunny situation. It is often stated that the English black mint does not flower. Whatever

may be the case in other localities, it may be seen flowering freely in Hitchin every summer.

The lack of sunlight due to the shadow cast by trees on the opposite bank prevented the production of the hairs bearing the oil cells, and reacted powerfully on the yield of oil, this being only 0·1 per cent. from the fresh herb. The odour was very good, some even feigned to believe it better than usual, and it had the characteristics given in the table, where it may be compared with the oil of peppermint produced by W. Ransom & Son in the same, and past, seasons. The yield of oil from the ordinary plants grown on the farm was 0·409 per cent. in the fresh herb, cut when in flower. It is worthy of notice that, if the weight of herb grown on the river bank had contained this percentage of oil, it would have yielded 46 lb. of oil to the acre.

The plants have since been removed from the river bank to a field so situated that the sunlight shines between the rows for the greater part of the day, and a very fine bed of plants has resulted. A similar bed of ordinary stock plants was planted beside them, the original intention being to distil them separately. This, however, was not done, the mixed plants being distilled. These gave a yield of 0·19 per cent. from the fresh herb distilled immediately after cutting. The herb from the other part of the farm was not weighed, so that only the areas could be compared. The yield from the mixed plants was 26½ lb. to the acre, whilst the yield from the farm was only 3¾ lb. to the acre. This latter was due to the fact that a heavy downpour of rain took place immediately after cutting the crop, and prevented it from being carted for three days. The results show the crop to have been practically ruined. It was too wet to weigh for purposes of comparison. The exceptionally low yield of the peppermint oil distilled in 1909 from the plants grown by the river bank prove very conclusively that the yield of oil from black peppermint is not increased by growing in damp and *shady* situations. From Mr. Burnett's result it had been hoped that the yield of oil might have been increased. It was recognized that it would have been better to have grown in a damp but not shady situation, sunlight being favourable to the production of aromatics, but it is not easy to obtain ground so situated as to be free from every disturbing factor.

The venture illustrates some of the disappointments which so often attend agricultural experiments, and many an observer has turned his back upon such a one and set his face once more

against the sun to whisper that by such failure yet shall he succeed.

PEPPERMINT OIL FROM RIVER BANK, 1909. NOT IN FLOWER

Yield.	Specific Gravity.	A_D.	Per cent. of Menthol (Combined).	Per cent. of Menthol (Free).	Per cent. of Menthol, Total.
0·1 per cent. 11¼ lb. per acre. .	0·9046	—27	3·9 per cent.	55·3 p. c.	59·2 p. c.

PEPPERMINT OIL GROWN ON A HEAVY LOAM WITH CHALKY SUBSOIL, 1909. IN FLOWER

Yield.	Specific Gravity.	A_D.	Per cent. of Menthol (Combined).	Per cent. of Menthol (Free).	Per cent. of Menthol, Total.
0·409 per cent.* .	0·9065	—27·4	5·57 p. c.	55·78 p. c.	61·35 p. c.

* Included in last table.

PEPPERMINT OIL GROWN ON A DEEP SANDY LOAM, 1910. MIXED PLANTS IN FLOWER

Yield.	Specific Gravity.	A_D.	Per cent. of Menthol (Combined).	Per cent. of Menthol (Free).	Per cent. of Menthol, Total.
0·19 per cent. 26¾ lb. per acre. .	0·9046	—28·2	4·74 p. c.	54·72 p. c.	59·46 p. c.

PEPPERMINT OIL, RANSOM'S, 1907–1910

Year.	Specific Gravity.	A_D.	Per cent. of Menthol (Combined).	Per cent. of Menthol, (Free).	Per cent. of Menthol, Total.
1907	0·9085	—30·7	6·69	56·17	62·86
1908	0·9090	—28·6	7·8	56·21	64·01
1909	0·9065	—27·4	5·57	55·78	61·35
1910	0·9058	—29·7	9·47	55·31	64·78

* Heavy loam with chalky subsoil.

Discussion

Mr. Harold Deane said that the paper just read was a very valuable one and also extremely instructive. It was interesting to note that the growing of peppermint in the shade did not tend to increase the yield of oil. Nevertheless, damp seemed to be beneficial, as he noticed that the best yield was obtained from peppermint which was grown in moist fields.

Mr. Brewis asked if the fact of allowing the plant to lie on the ground and dry before distilling the oil made any difference to the solubility of the oil in 70 per cent. alcohol in comparison to that distilled from the green herb. He had noticed that American mints differ considerably in solubility in this strength alcohol, and even some of the Mitcham mints were not absolutely soluble in 70 per cent. alcohol, but gave a slight opalescence.

Mr. Umney said that with regard to what Mr. Brewis had just stated, he had recently been all over the peppermint plantations in Italy and the Alpes Maritimes. Experiments were now being made on the absolutely fresh herb and the partly dried herb. From samples of the oil which he brought back with him from Pancalieri he was rather surprised to find that the ester from the fresh herb was as high as 23 per cent., while in some of the oil obtained from dry herb from the same yield the ester was only between 15 and 16 per cent. Whether this difference would be constant he could not, of course, say. They would be interested to hear that these plants were originally black Mitcham plants sent out from England, but the yield in Italy was from three to four times as great.

Mr. E. F. Harrison asked whether there was any difference in the yield of oil when using the partly dried herb compared with the fresh.

To this question Mr. Umney explained that the object of using the dried herb was in order to reduce the bulk of the herb used in distillation. Mr. Umney added that the output of the oil at Pancalieri was between 4,000 and 5,000 kilos. a year, so that it had become quite a big industry.

Mr. Ransom, in reply to Mr. Brewis, said he had no statistics on the point raised. The oil from the fresh herb was probably preferable to that obtained from the partially dried.

A hearty vote of thanks was accorded to the author.

THE COMPOSITION OF DIABETIC FOODS

By F. W. F. Arnaud, F.I.C

The term "diabetic foods" embraces a very wide class of food products, but in this communication gluten bread and flours only have been dealt with. The majority of the almond, milk protein, and soya bean, etc., preparations are known to contain less than 10 per cent. of starch, dextrin, and sugar together.

Twelve different samples, the product of seven manufacturers, have been examined, and the products of one manufacturer alone may be said to be satisfactory. The advertisement matter issued by many of these firms is of interest; one firm submits that its products are more nutritious than any other preparation of the kind; again, a statement advertised very generally is to the effect that the starch present in the foods has been altered by special methods, and exists in a modified form, so that it can be digested and assimilated by the diabetic subject. The statement that the starch is appreciably altered cannot be confirmed either by the qualitative iodine test or the microscope. A sample of an expensive diabetic food was found to consist of ordinary flour which had merely been heated.

Sample.	Water.	Fat.	Sugar, etc.	Dextrin.	Starch.	Protein.	Ash.	Cost per pound.	
								s.	*d.*
1a. Diabetic Bread .	9·65	0·45	3·27	0·63	7·66	76·22	2·10*	3	6
2a. Diabetic Biscuits	4·30	17·50†	2·25	1·00	6·81	65·90	2·74	8	0
3a. Diabetic Flour .	7·10	0·42	1·00	0·51	5·80	86·19	0·85	2	0
4. Diabetic Bread .	32·50	1·10	1·30	3·50	50·3	13·2	0·50	0	8
5. Diabetic Bread .	38·38	1·04	0·54	5·52	44·50	9·87	1·50	—	
6. Diabetic Bread .	9·0	1·30	1·35	4·21	50·01	34·53	0·95	2	10
7. Diabetic Bread .	36·32	0·68	0·24	9·76	46·41	7·94	1·15	0	7
8b. Diabetic Bread .	32·95	0·75	0·60	9·90	48·23	8·12	1·20	0	6
9b. Diabetic Flour .	9·45	1·50	1·12	6·80	70·15	11·56	1·60	0	7
10c. Diabetic White Bread . . .	33·20	1·04	0·30	4·20	44·10	17·94	1·50	0	6
11c. Diabetic Brown Bread . . .	32·95	0·41	1·30	4·07	40·10	22·02	1·55	0	6
12c. Diabetic Food .	5·05	1·15	1·65	6·58	70·51	13·39	2·65	2	6

* Contained P_2O_5 0·43 per cent.

† Hanus value 75·7 per cent. iodine. Refractive index at 35°C., 1·4685. Reduced Beehi solution.

The composition of the samples analysed is shown in the table above, together with the actual or approximate cost of the samples per pound.

The bread and flour were obtained from London, Cardiff, Liverpool, Portsmouth, and Cheltenham. The method of analysis adopted was as consistent with accuracy and speed as possible.

Method of Analysis

Two grammes of the prepared and powdered sample were weighed out and dried at 98°C. The water was usually found to have been expelled after four hours and the sample to have attained constant weight. The residue was then placed in a free cartridge and the fat extracted in a Soxhlet apparatus with either dry ether or petroleum ether. Identical results may be obtained by the use of either of the solvents. The extracted fat was dried and weighed. One hundred cubic centimetres of 93–95 per cent. by volume alcohol was then poured into the fat-free residue which had been transferred from the cartridge to a beaker. After frequent stirring during four hours or so the alcohol was filtered off, the residue washed with a few cubic centimetres of alcohol and the filtrate evaporated, this residue being assumed to be sugar. As 95 per cent. alcohol only dissolves about 0·23 Gm. cane sugar per 100 c.c., the above method of extraction would not be suitable if the percentage of sugar in any sample approached 10 per cent. In such a case the sample would have to be extracted with alcohol in a Soxhlet apparatus. To the fat and sugar-free sample 180–200 c.c. of cold water were added and allowed to remain several hours with frequent stirring. The aqueous solution, after filtration, was made up to 250 c.c. The nitrogen was determined by the Kjeldahl-Gunning process on 150 c.c. of this filtrate, and 100 c.c. were evaporated in a platinum basin and the weight of dry residue ascertained. The ash contained by this dry residue was then determined. The percentage of dextrin was ascertained by deducting the sum of the ash and proteins found in the aqueous extract from the amount of dry residue it contained. It is essential that the nitrogen and ash should be determined on this aqueous extract, for in the case of the genuine gluten bread over 5 per cent. of proteins were present in solution, and frequently the ash was found to approximate the total ash of the sample. Usually the solution was found to contain between 1 and 2 per cent. of proteins. The

starch in the dextrin-free residue was converted into dextrose by means of the hydrochloric acid process and estimated gravimetrically, using Fehling's solution.

Many of the starch determinations were confirmed by means of the diastatic process, but in the case of ordinary bread I found the conversion of the starch slow and therefore a tendency for the determination to be low. The diastatic process was, however, easily carried out with the genuine gluten products containing only a small quantity of starch. Though the hydrochloric acid method probably gives results a little high, it is expeditious, and duplicate experiments agree extremely well. A process for the direct estimation of starch by Buisson is worth recording, for though I did not find the process applicable to the estimation of starch in bread, the process works admirably with starch alone. Briefly, a weighed quantity of starch is heated with a dilute solution of picric acid, the rotation of the resulting solution being observed. A saturated solution of picric acid was prepared (about 12 Gm. dissolving in a litre of water) and 50 c.c. of this solution, together with 80 c.c. of distilled water, were added to 5 Gm. of starch contained in a 300 c.c. flask. The mixture was shaken and heated to 115°C. in an oil bath for thirty minutes. The liquid was then thoroughly cooled, made up to 200 c.c., and filtered after the addition of a little kieselguhr. The rotation of the filtrate may then be observed in a 5 dm. tube with ease.

The proteins were calculated from the total nitrogen estimation, the factor 6·25 being employed. The Kjeldahl-Gunning process was employed for the determination of the total nitrogen.

From the results of the analyses given in the table, it does appear expedient that some steps should be taken for the repression of the business carried on in the sale of ordinary bread and flour as specially prepared diabetic foodstuffs, or the composition of these foodstuffs should be declared to the purchaser.

Discussion

Mr. F. W. Gamble said he thought that the thanks of the Conference were certainly due to the author of this paper, but he also thought that the state of affairs here revealed was such that the matter should be carried very much further than the simple acceptance of the paper by the Conference. He thought

those present would agree that the figures given by the author revealed a scandalous state of affairs. These diabetic foods were sold at high prices, and it was obvious that the value of some of the preparations for diabetic purposes was no greater in a large proportion of cases than ordinary bread and flour, and the comparison between the respective costs was simply ridiculous. He would be interested to know if Mr. Arnaud had found any revelations in the literature which was supplied with the foods as to their respective compositions. He took it that surely their laws must in some way be applicable to misrepresentation of this kind. (Hear, hear.) An examination of the literature which frequently accompanies foods of this description sometimes shows that an indication is given that they were free from starch, and he thought it must be a misdemeanour in the legal sense to sell these preparations as diabetic food under such conditions. Therefore he suggested that if Mr. Arnaud was able to carry the work further it would be within the province of the Conference to make representations to the proper quarter. It was possible that this state of affairs was not thoroughly realized by those responsible for the administration of the Sale of Food and Drugs Act. It surely should be possible to stop such misrepresentation and fraud in some way. He understood that Mr. Arnaud said that the three kinds marked (a) were the products of one firm, and these showed what could be done in making satisfactory preparations. He would be interested to know if Mr. Arnaud had had any experience with some of the foreign bread sent into this country for diabetic purposes. He believed that one or two Swiss firms sent products of that nature into this country, and the impression in his mind was that they were greater in misrepresentation than many of the others. It was an extremely valuable paper, and he would like to suggest that it should not be buried in the reports of the Conference, but that the matter should be carried further.

Mr. Harold Deane said that the paper afforded further evidence of the need for thorough reform both in the Sale of Food and Drugs Act and in the administration of that Act. He was not competent to say whether our present Acts if efficiently administered could deal with this case, but he thought that what they wanted in Great Britain was a Food and Drugs Act similar to that in force in the United States of America, and administered by a man of the energy and ability of Dr. Wiley, who was one of their honorary members. He thoroughly agreed

with Mr. Gamble that something further should be done with this paper.

Mr. Umney instanced the case of a friend of his, a diabetic patient, who was not making the satisfactory progress anticipated by the medical attendant. On examination of the diabetic food which was being supplied it was found that it contained 42 per cent. of starch. In this instance, owing to the literature supplied, it would not have been difficult to have established a case under the Merchandise Marks Act, but the medical attendant did not wish to have his name brought into the case. He thought that any one who had had any experience of these foods, and the literature which usually accompanied them, would agree that it would be perfectly easy to take proceedings under the Act he had mentioned.

Mr. Rutherford Hill also agreed with Mr. Gamble. Attention had periodically been drawn to so-called diabetic foods, and Mr. Arnaud had again emphasized the evils connected with them. It would be a mistake that so valuable a paper should be lost, and he suggested that this be included in the scope of the resolution adopted at the Practice Section yesterday relating to proprietary secret medicines. There might be a doubt as to whether this could be included as coming into the category of medicines. If so he suggested that the Conference refer to the Executive Mr. Arnaud's paper, so that the facts disclosed therein might be considered and communicated to the Home Secretary with a view to some action being taken for the protection of the public if deemed advisable. He did not think they could successfully get at these transactions under the Food and Drugs Acts. At the same time, he was prepared to accept the suggestion made by Mr. Umney.

Mr. Harrison was very pleased to add his testimony to the excellence of Mr. Arnaud's paper, and he thought that it was a great advantage to have papers read by public analysts of the towns at which the Conference met from year to year. This was not the first time that a paper had been read by the public analyst of the town in which the Conference met, and they always found that these papers had been exceedingly helpful and valuable. He would like to emphasize the fact that they could not do too much to bring about closer co-operation between public analysts and pharmacists. He thought that the Local Committee was to be complimented on inducing Mr. Arnaud to take up this matter. One could not help regretting that Mr. Arnaud

had not given the names of the manufacturers of these preparations, but it was easy to grasp why that had not been done. He was interested in the figures given in regard to the diabetic biscuits. He personally knew of a brand of biscuit, which he thought was not included in the list, and which was very much above suspicion. He did not think that the firm he referred to also supplied bread and flour. Of course, the amount of starch shown to be present in some of these foods revealed, as Mr. Gamble had pointed out, an extraordinary state of affairs. He thought the amount of sugar shown to be present was also worthy of note. He was sorry Mr. Arnaud had not tested the sugar, as it was curious that the brand which was best from the point of view of starch was not the best from the sugar point of view. As regards the determination of the starch, he usually did it with diastase, and finished off with acid. That was a satisfactory method, and one which he preferred to use. Before sitting down he would like to point out that analyses of this kind had been published in the *British Medical Journal*, but not very recently, and he remembered one which was reprinted in "Secret Remedies," and the name of the maker was given. Full and complete publicity was, in his opinion, the best method of dealing with this question. In conclusion, he suggested that Mr. Arnaud should recommend to his authority the advisability of taking action under the Sale of Food and Drugs Act; he was inclined to think there was ground for a case under that Act.

Mr. Maben agreed with Mr. Arnaud that it ought to be possible to make it compulsory to have the composition of the foodstuffs plainly stated on the label. He was of the opinion that if a case were opened the manufacturers would easily obtain expert evidence to state that medical men did not find starch injurious. Medical opinion being divided, the sale of these products could not be interfered with under the Food and Drugs Act.

Mr. Finnemore said it would not cause any surprise that not one of the manufacturers of diabetic foods had accepted his invitation to be represented at the Conference—perhaps this was in view of the investigations which were recorded in this paper. He congratulated the Conference on the fact that this subject was included in the research list, and he also congratulated the local association on inducing Mr. Arnaud to take up the investigation.

Mr. Peck wished to propose a hearty vote of thanks to Mr.

Arnaud for his most excellent paper. Following suggestions made in the course of the discussion, he said he was afraid that if they tried to take action under the Sale of Food and Drugs Act or the Merchandise Marks Act they would find that the statements made by the manufacturers as to the form in which the starch was present would be used as a defence. He agreed that only very few of the diabetic foods on the market could be considered to be free from starch. In regard to Mr. Rutherford Hill's suggestion, he did not think there was any reason why a definite resolution should not go forth from the Conference, quite apart from the resolution carried in the Practice Section the previous day. He thought that Mr. Arnaud's suggestion that there should be compulsory declaration of the composition was a good one. Although he agreed to a certain extent with Mr. Maben's remarks, they must still remember that the older school of medical men was in favour of giving starch-free foods in diabetes.

Mr. Brewis seconded the vote of thanks, and inquired how far it was possible to make bread free from starch. He could quite understand that biscuits and flour could be made starch-free, but it would not be so easy in bread.

Mr. F. W. Crossley-Holland said that he had been in very close touch with many eminent practitioners, who were particularly interested in planning diabetic dietary, and he explained that there existed amongst them a sharp division of opinion as to the amount of starch which is admissible; one faction suggests 30 per cent. starch content as a limit, whilst on the other hand, others insist upon a diet that is practically starch-free. In the light of these differences of opinions, it would be interesting to inquire into the saving or inhibiting action of protein in retarding carbohydrate metabolism. This point would appear to be one of extreme importance in attempting to adjust the starch content of the food of the diabetic.

Mr. T. Stephenson said that the whole question of diabetic foods rested on the nature of diabetes. This, he believed, was by no means thoroughly understood, and until it was, it was impossible to lay down any rule for the composition of diabetic foods. Some years ago he read a paper to the Conference on the subject of Jambul seeds, showing the retarding effect on starch conversion by various preparations of the seeds. At that time it came out in the discussion that diabetes was not directly due to excessive starch conversion, and while that did not invalidate the results of his researches on Jambul it went to show how

imperfectly the etiology of the disease was understood. He held that until this was better understood it was impossible to frame any formula or to say what diabetic foods should or should not be.

Mr. HILL said that after the remarks of Mr. Peck he thought that it would meet the case if Mr. Arnaud's paper were referred to the Executive of the Conference, with a view to some action being taken for the protection of the public.

Mr. NAYLOR considered that the Conference should be cautious about moving in the direction of the first suggestion. The divided opinion of medical men on this subject should make the Conference pause before taking drastic action. It was not a question which the Conference could decide. He endorsed in very generous terms the remarks on the excellency of the paper.

Mr. UMNEY suggested that Mr. Arnaud should furnish Mr. Harrison with the names and results of the analyses, and that Mr. Harrison should communicate the results to the British Medical Association and allow them to take the responsibility.

Mr. DOTT supported Mr. Umney's suggestion.

Mr. A. R. SMITH called attention to the influence of carbohydrate on the metabolism of protein in the body, the presence of carbohydrate in the diet preventing loss of nitrogenous matter from the system.

Mr. RUTHERFORD HILL quite agreed with what Mr. Umney had suggested.

The PRESIDENT also expressed the opinion that the Conference should act cautiously in a matter of this kind. The discussion had revealed that the Sale of Food and Drugs Act was very difficult to work. If they took action without due consideration they might land themselves into difficulties. The question was one which medical men should take up, and where medical men disagreed he did not think it was for the pharmacist to decide.

Mr. GADD also advised caution. He pointed out that, although it was quite possible that there might have been offences, yet there was not sufficient evidence before the Conference to act upon.

Mr. RANSOM suggested that they should hear Mr. Arnaud's reply before coming to any decision.

Mr. ARNAUD, in replying, said that he thought that the discussion had been more valuable than the paper. As to the division of opinion with regard to the digestion of starch, he would only say that that was not the point which he desired

to press. The point which really interested them was that flour which might cost 6*d*. per lb. should not be sold at a ridiculously higher figure. He would be quite willing to give the names of the manufacturers to Mr. Harrison. It might be a question whether starch could under any circumstances be non-injurious to diabetic patients; but any form of starch which under the action of diastase was converted into sugar could not be of benefit given in unlimited quantity. Undoubtedly starch was given to diabetic patients by some medical men up to what was known as the toleration limit. In no case except one was an analysis of the food stated in the literature, and in only one case was it stated that starch was present, and in that case it was claimed that the starch was directly converted into water and CO_2. It would be seen that it would be difficult to bring a case under the Sale of Food and Drugs Act, whatever might be done under the Merchandise Marks Act or under the common law with regard to false pretences. He was not able to say whether the foreign products were very bad or not. He quite agreed that a man of the type of Dr. Wiley was wanted; although much is said against the Sale of Food and Drugs Act, yet nothing seems to be done to improve it. He felt quite sure that there were other brands of diabetic foods on the market which would come up to the same standard as the best of those which he had analysed. Bread could be made containing less than 5 per cent. of starch, but it was almost uneatable. That was where some manufacturers scored; they made a palatable bread with ordinary flour, and then advertised it as being quite suitable for diabetics. The question of the retardation of metabolism had been raised, but of this he had had no experience.

After some discussion the following resolution was agreed upon :—

> "That the chemical results published in Mr. Arnaud's paper on diabetic foods be referred to the Executive of the Conference to consider the advisability of communicating them to the British Medical Association."

A hearty vote of thanks was accorded to the author.

The following paper was read in abstract by Mr. FINNEMORE :—

NOTE ON THE CONSTITUTION OF COMMERCIAL BISMUTH SUBCHLORIDE

BY J. BRISTOWE P. HARRISON, F.I.C.

The subchloride of bismuth is not one of the articles of the British Pharmacopœia. The directions for preparing the compound as given in the British Pharmaceutical Codex are as follows :—

1. "By adding a solution of bismuth nitrate to a solution of sodium chloride."

2. "By adding a solution of bismuth nitrate to very dilute hydrochloric acid."

3. "By pouring a solution of bismuth oxide in hydrochloric acid into water."

These three methods depend on the insolubility of the oxychloride in very dilute nitric or hydrochloric acids.

In a paper relating to the constitution of commercial bismuth subnitrate (*Analyst*, 1910, **35**, 118) I showed that the constitution of the subchloride of bismuth prepared by heating bismuth subnitrate with solution of sodium chloride is represented as $Bi_{12}O_{13}Cl_{10}$, and not by the simpler formula BiOCl as had previously been supposed. This fact has an important bearing on the constitution of commercial bismuth subnitrate, viz. $6Bi_2O_3$, $5N_2O_5$, $8\frac{1}{2}H_2O$, as seen in the following equation :—

$$6Bi_2O_3,\ 5N_2O_5,\ 8\tfrac{1}{2}H_2O + 10NaCl + xH_2O = Bi_{12}O_{13}Cl_{10} + 10NaNO_3 + (x + 8\tfrac{1}{2}H_2O)$$

The fact that a commercial sample of bismuth subchloride having been analysed and found to contain 11·78 per cent. chloride—which is slightly in excess of that required by the constitution $Bi_{12}O_{13}Cl_{10}$—led me to prepare samples according to the methods of the B.P.C. in order to determine their constitution. Three preparations, each weighing about 10 Gm., were obtained by the above methods. In each case the product was washed two or three times by decantation, using about half a litre of cold distilled water per washing, and, after drying, the amount of chlorine was determined gravimetrically. The following are the results obtained :—

Method 1 gave a product containing 13·60 per cent. chlorine ; a compound containing 13·77 per cent. chlorine was obtained

by the second method, while Method 3 gave a subchloride containing 13·85 per cent. chlorine.

The compound $Bi_{12}O_{13}Cl_{10}$ contains theoretically 11·59 per cent. chlorine, while 13·66 per cent. chlorine should be found in BiOCl. These results conclusively show that the three methods of the Codex give rise to one and the same oxychloride, the constitution of which seems to depend on the fact that the parent bismuth compound must be previously brought into solution. It is at once obvious that the commercial sample already referred to cannot have been manufactured by any of the methods described int he B.P.C., and it became a point of interest to know how far these methods of preparation were being generally followed by bismuth manufacturers. With this object in view three samples of different manufacture were obtained, which I shall designate as A, B and C. These were analysed, with the following results :—

"A" contained 13·85 per cent. chlorine, corresponding to the constitution BiOCl.

The chlorine figure in "B" was found to be 12·23 per cent., which represented neither BiOCl nor $Bi_{12}O_{13}Cl_{10}$. In order to remove any soluble chloride that might have been present, 10 Gm. of the sample were washed three times by decantation, using about half a litre of cold distilled water each time and allowing an hour to elapse between each washing. After drying at 100°C. the percentage of chlorine was redetermined and found to be 12·13. This constancy of the chlorine figure, after washing in this manner, seemed to indicate that the sample was a true compound, and in order to settle this point 5 Gm. were twice washed with 250 c.c. boiling water. On again determining the chlorine the percentage was still 12·13, and 90·4 per cent. Bi_2O_3 was obtained when the preparation was converted into oxide. These figures correspond to a subchloride having the constitution $Bi_{16}O_{17}Cl_{14}$, which by theory contains 12·10 per cent. chlorine, and should yield 90·64 per cent. Bi_2O_3.

On determining the chlorine in sample "C" 12·11 per cent. was found which looked as if this were a compound of the same constitution as "B." On washing with cold distilled water the chlorine figure was reduced to 11·71, revealing the presence of soluble chloride, and on converting the washed and dried sample into oxide 91·0 per cent. Bi_2O_3 was obtained. The washed product, therefore, corresponded to $Bi_{12}O_{13}Cl_{10}$, which would yield 91·06 per cent. Bi_2O_3.

A point worthy of consideration is the manner in which sample "B" was probably prepared. It is inconceivable that the Codex methods of preparation, if properly carried out, should give rise to such a constitution. There is, however, the possibility that this compound was manufactured by boiling together solution of sodium chloride and a bismuth subnitrate possessing the constitution $8Bi_2O_3$, $7N_2O_5$, $9\frac{1}{2}H_2O$, corresponding to 16·29 per cent. N_2O_5. Such a constitution would be decidedly abnormal, for in the treatise on bismuth subnitrate (*loc. cit.*) the N_2O_5 figure, in ten commercial samples representing seven different manufacturers, never exceeded 15·81 per cent.

Admitting the value of such an assumption, however, then, from a knowledge of the constitution of any particular bismuth subchloride, the process that has been employed in its preparation can be ascribed with some degree of certainty to one of two general methods :—If BiOCl represents the constitution, then the product has in all probability been obtained by one of the modifications given in the British Pharmaceutical Codex, in which the parent bismuth compound is previously brought into solution. On the other hand, if the subchloride has been produced by boiling bismuth subnitrate with solution of sodium chloride, its constitution will be in general $Bi_{12}O_{13}Cl_{10}$, but will always be a function of that of the subnitrate used.

In conclusion, I beg to thank Messrs. Howards & Sons, Ltd., in whose laboratory this investigation was carried out, for permission to publish the results contained in this paper.

Discussion

Mr. Finnemore said bismuth subchloride had come into use in X-ray diagnosis with success. It had been formerly customary to use either the subnitrate or the oxycarbonate, but in the case of the former using two ounces for a dose some poisonous effect had been observed, and in the latter case the carbonate was liable to give off CO_2 in the stomach; these two factors led to his suggestion that subchloride should be used, which had proved very satisfactory. As much as ½ cwt. of this salt was used for this purpose at one hospital in twelve months.

Mr. Gamble asked if Mr. Finnemore had observed any variation in the opacity due to the use of the different salts of bismuth, and could he say what this variation depended upon? Was the opacity purely a function of the high atomic weight of bis-

muth, or did the molecular weight of the whole compound exert any influence in this way ?

Mr. STEPHENSON referred to a case of poisoning, which, it was suggested, was due to the metallic portion of the compound, and not to the nitrate.

Mr. FINNEMORE said that he did not think the poisoning was due to the metallic bismuth. It was an interesting point raised by Mr. Gamble, and he hoped to do further work on the subject.

The PRESIDENT voiced the thanks of the meeting to the author for his excellent contribution.

The following paper was ready by Mr. FINNEMORE :—

NOTE ON BARTSIA ODONTITES

By H. FINNEMORE AND G. E. TOWN

Bartsia Odontites is a very common wayside plant of the natural order Schrophulariaceæ and although no toxic activity has been ascribed to it, it is well known to be avoided by cattle. Bearing in mind the haphazard methods in which our knowledge of the use of medicinal plants has emerged, and also the fact that plants botanically related often contain similar chemical constituents, it occurred to us that this relative of digitalis might possibly be worthy of pharmacological and even of chemical study.

Fourteen lbs. of the whole plant were collected when in flower, dried in the sun, and completely extracted with hot alcohol in a continuous extraction apparatus. The alcoholic solution was concentrated, and a sample of the product submitted to Dr. P. P. Laidlaw, who kindly tested its action on frogs. He found that it had no poisonous or digitalis-like effect.

On allowing the alcoholic solution, made as described above, to stand for twenty-four hours, a fairly large amount of crystalline matter separated in a nearly pure condition, and although the plant was inactive and it was not therefore our intenton to examine it chemically, we felt it would be of interest to purify these crystals, and, if possible, identify them.

They proved to be mannitol, and were identified both by their composition and melting point, and by that of their acetyl derivative.

DISCUSSION

Mr. POLLARD thanked Mr. Finnemore for this interesting communication ; he had no criticism to offer on it except that

the notion was very far-fetched that plants of the same natural order often contain similar substances, and said that the probability was the members of the Conference would be able to see this plant growing at Newchurch, on the excursion which was to take place on the following day.

The following communication was read in abstract by Mr. Finnemore :—

WHITE PRECIPITATE AND THE ANALYSIS OF WHITE PRECIPITATE OINTMENT

By G. D. Elsdon, B.Sc.

Formerly Priestley Research Scholar in the University of Birmingham.

Some years ago several papers and letters were published drawing attention to the B.P. requirements for white precipitate, and to the fact that it was practically impossible under commercial conditions to prepare a compound of good colour which would answer to them. The question of the estimation of mercury this and other compounds was also discussed (Bennett, *P.J.*, **65,** 575 ; Tyrer, *P.J.*, **65,** 632 ; Tyrer, *Y.B.P.*, 1906, 302 ; Thompson, *P.J.*, **58,** 117).

I propose to give a short account of the method I have adopted for the estimation of mercury, together with the composition of current samples of white precipitate as determined by that method.

1. The Estimation of Mercury

The three principal methods of estimating mercury are—by distillation with lime, as the sulphide, and by reduction *e.g.*, with hypophosphorous acid. The first of these, although capable of considerable accuracy in experienced hands, is not available for routine work on account of the length of time required and the fact that it needs almost continuous attention. We are left, therefore, with a choice between the sulphide method and the hypophosphorous acid method.

There seems to be no doubt that the sulphide method gives results which are 0·5–0·6 per cent. higher than those given by the hypophosphorous acid method, but there has been a tendency to attribute the whole of this difference to the inaccuracy of the sulphide method. From a careful examination of the different papers on the subject, I have come to the conclusion that this difference is about evenly distributed, the hypophosphorous method giving results a little too low and the sulphide method

results a little too high (Howard, *J.S.C.I.*, **23,** 151). Contrary to the published statements, I find the sulphide method equally accurate, and as it seems in practice easier to manage, I have used it exclusively in all experiments described in this paper, the working details being as follows :—

About 1 Gm. of the salt is dissolved in about 75 c.c. of water containing 15 c.c. of concentrated HCl, the whole then diluted with water to about 500 c.c., and H_2S gas passed to saturation. The liquid is then immediately filtered through a Gooch crucible, and the precipitate washed with several quantities of cold water, and finally twice with alcohol (industrial methylated spirit). It is then dried in the steam oven until constant in weight—usually two hours is quite sufficient. Washing the precipitate with carbon disulphide makes practically no difference to its weight ; the amount of free sulphur formed under the above conditions is very small, not exceeding 0·1 per cent. of the weight of the precipitate, and probably much less. The Gooch crucible is much to be preferred to a tared filter, as the results given by the former are more constant. The Gooch crucible is prepared as follows :—

Specially prepared "Gooch" asbestos is gently rubbed in a mortar with concentrated nitric acid, and the resulting mixture poured into the crucible and allowed to filter. The layer of asbestos thus formed is then thoroughly washed with water and finally with alcohol, and dried in the steam oven until constant in weight, this usually not taking more than half an hour. Filtration is effected by means of a water-pump, the crucible being attached to the filter flask by a piece of wide rubber tubing passed over a thistle funnel.

In order to test the accuracy of the above process I obtained two samples of pure mercuric chloride, one of which (Sample A) was from Kahlbaum's. Using these samples the following results were obtained :—

Weight of $HgCl_2$ used.	Weight of HgS obtained.	Per cent. Hg found.	Per cent. of Hg on Dry Sample.
Sample A.			
1. 1·0516 . .	0·9016	73·81	74·11
2. 1·1508 . .	0·9844	73·69	73·99
3. 1·0953 . .	0·9374	73·76	74·06
Sample B.			
1. 1·2442 . .	1·0668	73·92	74·06
2. 1·2316 . .	1·0562	73·95	74·09

Theoretical percentage of Hg in $HgCl_2$ = 73·84 per cent. Factor HgS into Hg = 0·8618. Cl = 35·46. Hg = 200·0. S = 32·07.

These results confirm the statement which has already been made many times, that the sulphide method gives results that are somewhat too high, but I contend that the process is, in respect to its accuracy, no worse than the others in general use, and that it is to be preferred on account of its speed and simplicity.

2. The Composition of White Precipitate

I have been informed on excellent authority that "No doubt, owing to these questions being raised, and probably therefore greater care and trouble taken over the matter, Hyd. Ammon. lump seems to range somewhat higher now in percentage than it used to do all round." This statement is thoroughly supported by the figures (given below) which have been obtained on commercial samples. Five of these were kindly sent to me by Messrs. T. Tyrer & Co., Limited, of Stratford, London, E., the rest were obtained from retail pharmacists in the ordinary course of business. The figures obtained on the samples supplied by Messrs. Tyrer agree closely with those on the same samples done in their laboratory.

Sample.	Per cent. Hg.	Per cent. Moisture.	Sample.	Per cent. Hg.	Per cent. Moisture.
A . . .	77·96	0·47	G . . .	77·63	0·59
B . . .	78·42	0·53	H . . .	78·49	0·51
C . . .	77·24	0·69	I . . .	78·18	0·39
D . . .	76·96	1·06	J . . .	77·58	0·58
E . . .	77·12	0·38	K . . .	77·02	0·46
F . . .	78·21	0·47	L . . .	77·76	0·57

3. The Analysis of White Precipitate Ointment

Several methods have been suggested for the analysis of white precipitate ointment, but, so far as I am aware, the perfect process has yet to make its appearance, the chief difficulty lying in the separation of the inorganic material from the fatty basis; in theory nothing could be easier, but in practice the operation is not performed with the ease that one might wish for. Most of the published processes are very tedious, and after trying all of them the following modification seemed to be a decided improvement.

About 2 Gm. of the well-mixed ointment are weighed out into an ordinary glass funnel (about 5 Cm. diameter) having its stem cut off to about 1 Cm. long. The funnel is then placed in the neck of a small separator (about 70 c.c. capacity), having a very short stem. The whole is then supported in a thick glass beaker and placed in the steam-oven, where in a short time the ointment melts and runs through into the separator. The ointment remaining in the funnel is then washed into the separator with 20 c.c. boiling roughly normal HCl, 10 c.c. boiling petrol, and 10 c.c. more of roughly normal HCl in succession, the stopper inserted and the whole well shaken. On standing, separation is almost immediate, the white precipitate dissolving in the HCl and the paraffin in the upper layer of petrol. The lower layer is then carefully drawn off and the stem of the separator washed with water, the washings being added to the separated liquid. The petrol solution is then washed in the separator with a further 20 c.c. of boiling roughly normal HCl, which may be poured through the funnel if the previous treatments have not removed all the ointment from it ; this is separated and added to the previous extract. Practically the whole of the mercury can be removed in the first separation if care be taken, but a further washing is desirable. In any case of doubt a third washing should be made and tested for mercury separately. The mixed extracts are then cooled and filtered from particles of fat, the filter being washed well with water and the washings added to the filtrate, diluted to about 400 c.c., and H_2S gas passed to saturation. The precipitated HgS is then estimated by means of the Gooch crucible in the ordinary way. In calculating the NH_2HgCl from the HgS it is advisable to take NH_2HgCl as containing 77 per cent. of mercury in order to allow for the variability of commercial samples.

In order to test the accuracy of the process three ointments were made containing respectively 7 per cent., 10 per cent., and 13 per cent. of white precipitate, Sample H being used, containing 78·49 per cent. of mercury. The following results were obtained :—

	7 per cent.	10 per cent.	13 per cent.
Estimation 1	7·04	10·03	12·86
Estimation 2	6·92	10·04	13·02
Estimation 3	7·04	9·98	12·98

The figures are the percentages of white precipitate found by experiment.

As a rapid sorting test for the ointment base used treatment with concentrated H_2SO_4 has proved most successful. White precipitate ointment should be prepared with white paraffin ointment, and treatment with concentrated H_2SO_4 rapidly and certainly distinguishes this from all other ointment bases. The method of carrying out the test is as follows. About 5 Gm. of the ointment are placed in a small beaker (40 c.c.) and about 20 c.c. of strong sulphuric acid poured on, and the whole gently warmed by putting on the top of the water-oven. In the case of all bases, with the exception of white paraffin ointment, charring takes place at once, while in this case no immediate charring takes place, and very little on warming. The use of carelessly purified soft paraffin also becomes evident, as much more charring takes place with yellow soft paraffin than with white soft paraffin. On cooling, these differences become even more marked. In the case of ointment made with a paraffin base a cake is found on the top, almost white from white paraffin ointment, brown to black for yellow paraffin ointment, while in the case of ointment made with other bases no such cake is found.

If from this preliminary experiment the presence of some other base than paraffin is suspected, it may be further examined by the iodine value, this figure being done on the ointment itself. Correctly prepared white precipitate ointment will not have an iodine absorption value of much above 10 per cent. (seven samples varying from 8 to 12 per cent.), whilst ointments containing other bases will have iodine figures much higher than these, zinc ointment giving 60 to 70 per cent.

Several samples taken in Birmingham under the Sale of Food and Drugs Act have been examined by the above methods, with results as given in the following table. It will be noted that the majority of the unsatisfactory samples were obtained from unqualified vendors. The form of label on the box is also given together with the status of the vendor.

All the samples with the exception of "A" were practically free from ash.

Sample "A" contained 15·9 per cent. of ZnO; the vendor was prosecuted and fined. Samples "C" and "S" were obtained from the same vendor, and, as far as could be ascertained, were dispensed from the same jar. It will be noticed that the mean percentage of white precipitate in the two samples is 10·2, so that the low value of the second sample was probably due to careless mixing; the vendor was cautioned. Samples "G"

Sample.	Colour of Paraffin Cake.	White Precip. per cent.	Form of Label.	Vendor.
A	No Cake .	0·0	No label	Drysalter
B	Dirty White	9·7	Precipitate Ointment, Poison; and name of Vendor	Qualified
C	Dirty White	13·4	The Ointment, Poison ; and name of Vendor	Qualified
S	Dirty White	7·1	—	Same Vendor
D	Dirty White	10·4	White Precipitate Ointment, Poison ; and name of Vendor	Qualified
E	White . .	9·4	Precipitate Ointment, Poison ; and name of Vendor	Qualified
F	Dirty White	9·0	Precipitate Ointment, Poison; and name of Vendor	Qualified
G	Dirty White	5·7	No label	Drysalter, Qualified Assistant
R	Dirty White	5·6	—	Same Vendor
H	White . .	10·5	No label	—
K	White . .	10·2	White Precipitate Ointment, Poison ; and name of Vendor	Qualified
L	Dirty White	10·1	White Precipitate Ointment, Poison ; and name of Vendor	Qualified
M	Dirty White	10·3	Precipitate Ointment, Poison; and name of Vendor	Qualified
N	Dirty White	11·5	White Precipitate, Poison ; and name of Vendor	Qualified
O	Dirty White	9·5	White Precipitate Ointment, Poison; and name of Vendor	Qualified Assistant
P	Dirty White	8·6	White Precipitate Ointment, Poison ; and name of Vendor	Qualified
T	Dirty White	8·5	—	Same Vendor
Q	White . .	10·0	No label	Qualified

and " R " were obtained from the same vendor, a drysalter with a qualified assistant ; he was prosecuted and ordered to pay the costs. Samples " P " and " T " were from the same dealer, who was cautioned.

It would appear that it is by no means difficult to prepare an ointment answering to the B.P. requirement of 10 per cent. of white precipitate if care be taken to obtain a uniform sample by thorough mixing. The substitution of zinc ointment is sometimes attempted by unqualified dealers, but this is easily detected by the estimation and examination of the ash.

In conclusion I wish to thank my chief, Mr. J. F. Liverseege, for his valuable criticism and advice given throughout the investigation.

City Analyst's Laboratory, Birmingham.

Discussion

Mr. Finnemore pointed out that Mr. Elsdon was a new contributor to the Conference, and it was the sort of paper which they wished to encourage.

Mr. Wippell Gadd spoke as to the value of the paper, which was most useful.

PRACTICE SECTION

A meeting of the newly-constituted Practice Section was held on Tuesday afternoon, July 25. The first subject under consideration was Secret and Proprietary Medicines, at which Mr. J. C. Umney presided. Mr. E. Saville Peck gave the result of certain inquiries which the Conference had made upon that subject among the local pharmaceutical associations in Great Britain. He said a list of questions dealing with the subject had been distributed amongst the various local associations throughout England, Scotland, Wales, and Ireland, and replies had been received as follows. From associations in England 88, Scotland 11, Wales 3, and Ireland 1. Those replies had been tabulated, and the answers made up into percentages, and for the information of the Conference he proposed to read the actual questions and give the percentage of the replies. The following were the questions put, and the character of the replies received thereto :—

1. Is the sale of secret and proprietary medicines through the agency of the pharmacist considerable in your district ?—One hundred per cent. of the replies to that were in the affirmative.

2. Is there in your district, so far as you know, much sale of secret and proprietary medicine direct from the makers to the consumers through the post ?—Affirmatives, 46 per cent. ; negatives, 20 per cent. ; doubtfuls, 34 per cent.

3. Are proprietary medicines ordered by medical men to any considerable extent in your district ?—Affirmatives, 86 per cent. ; negatives, 10 per cent. ; doubtfuls, 4 per cent.

4. If so, is it by prescription or by verbal recommendation ?—By prescription, 20 per cent. ; by verbal recommendation, 20

per cent.; both by prescription and by verbal recommendation. 60 per cent.

5. Are the proprietary articles which are ordered by prescription usually single substances made by a patent process or under a protected name (*e.g.*, veronal, stovaine, etc.), or mixtures which any competent pharmacist might be supposed to be able to prepare if the formula were known ?—The replies were : Single substances, 6 per cent.; mixtures, 6 per cent.; both single substances and mixtures, 84 per cent.; neutral, 4 per cent.

6. Do you consider that a compulsory declaration on the label of a proprietary medicine of the names of the principal ingredients would injure the sale of any proprietary article you know ? —In the affirmative, 74 per cent.; in the negative, 26 per cent. That was to say, that 74 per cent. of the associations throughout the country were of opinion that the compulsory declaration on the label of proprietary medicines of the names of the principal ingredients would injure the sale of proprietary articles.

7. If so, are the ones which would be injured such as you would regard as legitimate proprietaries, or are they quack remedies sold for prices greatly above their value by means of specious advertising ?—The replies to that were that 66 per cent. of the associations inquired of considered that the injury would be to quack remedies; to legitimate proprietaries, only 2 per cent.; to both legitimate and quack remedies, 22 per cent.; and to neither, 10 per cent.

8. Question No. 8 was a very significant one. Would you regard with favour proposals for legislation on the lines suggested in Question 6 ? That was to say, that there should be compulsory declaration ?—In the affirmative, 70 per cent.; in the negative, 24 per cent.; doubtful, 6 per cent.

10. Do you favour joint action on the part of the chemists for the purpose of bringing the present evils of the quack medicine trade clearly to the notice of (*a*) the public, (*b*) the medical profession ?—In the affirmative, 64 per cent. as to the public; negative, 28 per cent.; doubtful, 8 per cent. As to the medical profession (*b*), affirmative, 74 per cent.; negative, 18 per cent.; doubtful, 8 per cent.

9. (He preferred to take them in this order.) Can you suggest any other, or better means of checking the sale of quack medicines without injuring legitimate proprietaries ? Then he would take Question 11, because 9, 11, and 12 were all grouped together in the remarks which he had culled from the different reports. 11.

If so, can you make any suggestion as to what steps should be taken at the present time? And 12 was: "Any further remarks?" Various suggestions had been made in reply to 9, 11, and 12. It had been suggested that there should be a suppression of the unjustifiable advertisements; that the matter should be taken up by some less directly interested parties than the pharmacists, for example, a Royal Commission; another association suggested that all medicine advertisements should be submitted to the opinion of a Central Board comprising medical men, pharmacists, and laymen; it was also suggested that there should be an association started by medical men and pharmacists for the express purpose of compiling pamphlets exposing the evils of proprietaries and self-drugging with such preparations. The Oxford Association suggested that the next edition of the Pharmaceutical Codex should be brought more prominently before the medical profession, and other associations made similar suggestions. Several associations were fearful that a disclosure of the ingredients of proprietaries would have an injurious effect on the sale of chemists' own proprietaries. The special points to which the reports seemed to draw attention were these—

(*a*) That it was the unanimous opinion of the local Pharmaceutical Associations that the sale of secret and proprietary medicines through the agency of the pharmacist was considerable.

(*b*) That 86 per cent. were of the opinion that these medicines are ordered to a considerable extent by medical men both by prescription and verbally.

(*c*) That 84 per cent. are of opinion that the substances ordered are single substances under a protected name or mixtures which any competent pharmacist might be supposed to be able to prepare if the formula were known.

(*d*) That 70 per cent. would welcome legislation to makes the declaration of the principal ingredients compulsory.

(*e*) That 88 per cent. agree that such declaration would injure the sale of the so-called quack medicines.

(*f*) That joint action be taken by medical and pharmaceutical bodies to bring about a more satisfactory state of affairs.

Similar suggestions were also sent in by the local corresponding secretaries.

The following paper was then read by the author :—

SECRET AND PROPRIETARY MEDICINES

By E. F. Harrison, B.Sc., F.I.C.

It is not necessary to spend many words in justifying our devoting some time to the consideration of this subject. Secret medicines have attracted a considerable amount of attention of late ; the medical profession, in particular, has shown that it regards the way in which they are advertised and sold as highly unsatisfactory ; the lay public has begun to show a good deal of interest, and two successive Home Secretaries have half promised a committee of inquiry into the whole subject, the second of these half-promises having been given only a few weeks ago, and having reference to the appointment of such a committee in the next session of Parliament. Pharmacists have much to do with secret and proprietary medicines in several ways, and are in a position to know more about the matter than most other people ; but there is a little danger that they may sometimes not be able to see the wood for the trees—that is, that particular aspects or portions of the matter which may touch their interests may hinder the taking of a comprehensive view of the whole question. I believe it to be important that pharmacists should examine the matter dispassionately and carefully sort out their ideas upon it, and I hope this discussion may contribute materially to that end.

You will observe that the subject is not merely secret medicines, but secret and proprietary medicines, the two things not being necessarily identical ; many different kinds of preparations, varying greatly in their merits or demerits, come under one or both of these headings, and it is worth while to attempt some sort of classification. First of all, there are the purely quack medicines ; as you know, an individual or a company, with no medical or pharmaceutical knowledge or qualification whatever, is at liberty to compound a pill, tablet, mixture, ointment or any other form of medicine, out of quite inappropriate or inactive ingredients, such as coloured and flavoured water, bread, flour, etc., etc., to put it up in packages with directions for use, to advertise it most extensively in newspapers, on hoardings, or in any other way, as the most wonderful and infallible cure for some disease, including such deadly ones as cancer or consumption, or for twenty different diseases, or even for any and every disease to which mankind is subject, and to charge a high price for what perhaps costs almost nothing and is worth nothing—a price which the purchaser would

never think of paying if he knew what he was getting for his money, but which he is induced to pay by lying advertisements as to its curative properties. I am drawing no fancy picture; probably every one here knows as well as I do myself of definite cases in which the claims made in advertisements have no shadow of foundation in fact, and where perfectly useless medicines are sold at a high price by means of such advertisements. Many of the worst examples of this class do not pass through the hand of the chemist or other retailer, but the prospective purchaser is induced to write direct to the maker; the latter then not only gets the retailer's profit as well as the maker's, but he can and does work further upon the feelings of the patient by letters and circulars, and, if he can persuade the patient that he is benefited, can extract a testimonial in return for some concession in price.

There is not much difference between the methods of this class of quacks and those who advertise special skill or experience in treating some complaint, require the applicant to supply details of his symptoms, and then treat the case through the post with medicines which are *said* to be made up specially for each individual. In this way an extensive medical practice is carried on by unqualified persons, in which the patient pays cash in advance, usually at a higher rate than many doctors would charge, and does not see and is not seen by the person who prescribes for him. These two classes of thorough-going quack medicines naturally do not come much under the notice of the pharmacist in the ordinary way of business, but any one who will take the trouble to make a study of advertisements and follow some of them up by corresponding with the advertisers can easily satisfy himself that I do not exaggerate in what I have said about them.

The next class of secret medicines, which is probably by far the largest, contains aperient pills, cough mixtures, and other medicines which certainly do contain real drugs having activity and usefulness in some, at least, of the disorders for which they are advertised. As a rule, the advertisements of such preparations contain gross exaggerations and false promises. I do not refer now to such harmless and almost meaningless statements as that so-and-so's pills are worth a guinea a box, but to such specific statements as that the preparation in question will cure all cases of whatever the particular complaint may be, when all other remedies have failed. The worst and least scrupulous advertisers force the pace for the rest, and the proprietor of a secret remedy who determined

to speak the truth, the whole truth, and nothing but the truth, would be well advised to go into some other business before he had lost all his money.

There is, however, a somewhat small class of proprietary medicines, some of them having a very large sale and being widely advertised, which are non-secret—that is, their principal ingredients are plainly declared; certain preparations of cod-liver oil and of petroleum will occur to all of you as representative of this class. Other medicines, again, are protected by a trade-mark, and not only the names of the principal ingredients but the exact proportions in which they are present are clearly set forth on the label. These are the farthest possible removed from the secret nostrum with which I began, and a very strong case can be made out for them.

If a man, by his special ability or experience or study, perhaps as the result of costly experiments, discovers some new way of combining certain medicines of known value so that their efficiency is increased, either directly, or indirectly through their being rendered more palatable or otherwise acceptable, nobody will deny that he is entitled to profit by his special knowledge; and it may be asked, What better or simpler way of doing so can be found than for him to issue his product as a proprietary article, indicating by advertisement what are the complaints for which it is proper to be taken, keeping to himself the particular secret of its composition or method of preparation to which its special merits are due, and paying himself by charging a somewhat higher price than he could obtain if there were no secret and all his competitors were free to make the same? At any rate, such a method of paying for special skill or knowledge, if not the best, is very defensible.

We next come to the very large class of chemists' proprietaries. Most of these are comparatively but little advertised, circulars for distribution to customers, and a few announcements in local publications representing the extent of it in the majority of cases. There is correspondingly less exaggeration in the claims made, though it could not be pretended for a moment that there is none. I know of cases where chemists advertise their proprietary medicines quite as blatantly and recklessly as unqualified proprietors of nostrums; but this is the exception. The majority of chemists' proprietaries will be found, I think, to rest *more or less* upon the sort of basis I referred to just now as a fair justification of a proprietary medicine. I do not say that their existence

is altogether satisfactory, but I am decidedly of opinion that if they were to be rapidly legislated out of existence, the vacant place would be filled by amateur self-drugging on the part of the public which would as a rule be a change for the worse for all concerned. Also, many chemists' proprietaries are for the treatment of complaints for which hardly any one would take medical advice. Corn cures will serve as an example of this; and there is a gradual transition from purely medicinal articles to purely toilet articles, and it will hardly be suggested that there is anything improper or undesirable in the latter being proprietaries.

There is a very large class of proprietary medicines, varying quite as widely in merit as those of any other class, which are not advertised and sold to the public at all, but to the medical profession. The practical pharmacist not only knows much better than the public how drugs should be prepared and compounded to the greatest advantage, he also usually knows more about this than the doctor, and it is only natural that he should. No one here will deny that the doctor is the only proper person to diagnose what is wrong with a patient, and to decide what are the proper drugs to be given; but when it comes to choosing the best preparation of the drug decided on, or the best combination with subsidiary drugs, it is probably only the exceptional doctor who is really able to do this satisfactorily, and a large number frequently take advantage of the ready-made combinations which are so assiduously brought to their notice by various firms and persons, both pharmacists and otherwise, and order some proprietary medicine. Probably the greatest blow which such proprietaries have received in recent years has been the publication of the British Pharmaceutical Codex, in which the skill of pharmacists in devising the best preparations and combinations is made available to the medical profession without any elements of secrecy, and with a much greater probability of the patient getting what is ordered without delay, such as may be caused if a proprietary article is to be obtained.

Now a few words as to the usefulness, or otherwise, of nostrums, from the point of view of the public. Of course, there is a demand for them, or there would not be the enormous trade in them that there is; but the demand is partly factitious. A demand for an article may be created by advertising, and the public may be the better and richer for having the demand first created and then supplied. But this is certainly not the case with most secret

proprietary medicines ; the creation of the demand in this case very largely consists in persuading people by cunning and sensational advertisements that they are suffering from serious diseases when they are not, and that the medicine in question will cure them. The imaginary disease yields in very many cases to the pretended cure, under the influence of " suggestion " conveyed by circulars which accompany the package, and often also by letters sent by the proprietors, but there is no advantage to the public in the whole transaction—quite the reverse. If, however, the patient is really suffering from serious disease, of course it *may* happen, by the rarest of good luck, that the medicine will be suitable, in the doses given, for his constitution and for the particular stage which the disease may have reached. In such a case he probably receives no worse injury than the injury to his pocket in paying a much higher price for the stuff than he could have bought it for at his chemist's. But the chance of the medicine being suitable when no skilled diagnosis has been made, is very small ; and when it is not suitable the patient is either injured positively, or negatively by being kept from obtaining proper advice. I submit that from the point of view of the public the sale of secret nostrums, the demand for which is created by exaggerated and mendacious advertisements, is almost entirely bad. There is, however, a bona fide demand for medicines suitably compounded, with simple indications as to the complaints for which they are suitable ; and this constitutes at present a legitimate field for proprietary medicines. Perhaps when the millennium has arrived, when all prescribing is done by qualified and highly able medical practitioners, and all dispensing by qualified and highly able pharmacists, and no one is so foolish or wicked as to think of doctoring himself in any circumstances, all proprietary or secret remedies may be made an absolute end of ; but that day is scarcely yet in sight.

I do not think it will be seriously contested that there are good proprietary medicines and bad, very bad ones, with almost every possible gradation between them. I believe that legislative interference with the bad ones is greatly needed, and is likely to come about before long. Such interference need not curtail the legitimate interests of the proprietors of *bona fide* medicines, and I think it should be made clear that it is only those which rest on fraud and quackery that are aimed at, and not all indiscriminately. The owners of honest proprietary medicines have no interest in supporting or aiding the real quack medicines, their illegitimate

competitors; but ill-considered attacks might lead to their making common cause.

A good many suggestions have been made in regard to new legislation on this subject. The one which has found most favour with the medical profession, and seems likely to be put forward as representing their official demand, is that the law should make it compulsory for all medicines advertised or sold for the cure of disease, when not supplied to a medical prescription, to bear on the label a full statement of their exact composition, and that the label should have the force of a warranty, with penalties for misstatements. Proprietary medicines would then be in the same position as other medicines and foods now are under the Sale of Food and Drugs Acts, and the purchaser would be protected from misdescription and fraud in the same way as he is with other articles, and as he certainly ought to be in a civilized community. This proposal appears to me to be certainly in the right direction in which to proceed, though I think it goes a little too far. I suggest that it would be enough to require the declaration on the label of the names of all the principal ingredients, and the exact quantities of any coming within the poisons schedule or possessing great activity. I think the proprietor might be allowed to keep to himself the nature of subsidiary ingredients used, for example, as emulsifying or flavouring agents, and the exact proportions in which the different constituents were combined; but, of course, suppression of a name of a principal ingredient should be just as much an offence as naming one that was not present; and the onus should be on the proprietor of justifying an omission to name an ingredient on the ground that it was not one of the principal ones.

I do not think there can be much doubt that legislation on such lines would make it impossible for the fraudulent quack medicines to go on. These nostrums depend for their existence, not on any special skill in compounding or on any knowledge of the best combinations which it is desirable to keep secret from competitors, but on keeping secret from the public the fact that their composition is such that they cannot possibly cure the diseases which they are professed to cure. Very few people would be so foolish as to buy an article when the chemist they bought it from could tell them that its maker's own statement as to its composition showed that it would not have the wonderful results pretended. But an interesting and important question is, How far would such compulsory declaration on the label injure *bona fide*

proprietaries ? My own opinion is, scarcely at all. I think this view is justified by the fact that with quite a considerable number of proprietaries, including some having a very large sale at a fairly high price, no secret is made of the nature of the chief ingredients ; the secrecy lies in the special skill in selecting the best qualities and combining them in the best way. Most chemists' proprietaries, I think, would not suffer materially through the chief ingredients being declared. On this matter I shall be glad to hear what others say.

For several reasons, however, I think any new legislation on this subject should be preceded by a thorough public inquiry. Publicity and exposure are the worst foes to quackery, and an inquiry by a Royal Commission or similar body would do a good deal in enlightening the public. Any inquiry or exposure by the medical profession or by pharmacists, useful and desirable as these would be, would not carry nearly so much weight, and it would be easy to raise a suspicion of interested motives. The lay Press would probably give no publicity to any action by a less important body than a Royal Commission or a Departmental Committee, as patent medicine makers are such huge advertisers that it would scarcely be an exaggeration to say that they have the Press in their pocket. I beg, therefore, to move the resolution, copies of which have been published, which is as follows :—

> "This meeting of the British Pharmaceutical Conference is of opinion that a public inquiry by a Royal Commission or a Departmental Committee should be held in regard to the advertising and sale of proprietary secret medicines and the law relating thereto, with a view to further legislation for the prevention of fraud and quackery."

In conclusion, let me remark that this subject is a very large one, on which there is a great deal to be said. I have made no attempt to go into it exhaustively to-day, but have severely restricted myself to a few remarks intended to elicit what I hope will be a very useful discussion.

Discussion

Mr. Wippell Gadd, in seconding the resolution, said that it was desirable before considering amending legislation to have a clear conception of the present law on the subject. At present any poison could be put up in a proprietary medicine for sale, and have such qualities attributed to it as a vivid imagination

might suggest. It was true that if it contained a scheduled poison it came within the scope of the Pharmacy Acts, but these Acts did not apply to manufacturers as such. Where proprietary rights were claimed, or curative virtues attributed, the Medicine Stamp Acts applied, but these too often only served to lend a spurious air of authority to mendacious audacity. But in framing amending legislation it was important to avoid doing hardship to legitimate interests, and it was most important that full inquiry should be held. He thought that Mr. Harrison's suggestion that the principal ingredients of every medicine should be indicated on the label with the quantities of those which were most potent, was a reasonable one. It would help to suppress those medicines which were little better than fraudulent, without, he thought, injuring legitimate interests. Genuine discoverers could protect their ideas by letters patent, and others who presented well-known remedies in improved forms had common law rights which would protect the firm from colourable imitations.

The CHAIRMAN said that although all doubtless favoured the motion there might be many different ideas as to the best way of carrying it into effect. As Chairman of the Proprietary Articles Section of the London Chamber of Commerce, and as Chairman of the Proprietary Articles Trade Association, he had, of course, come into close contact with the manufacturers of many proprietary articles, and had heard their views on the subject. So far as he could find out, the bulk of the proprietors of proprietary medicines were prepared to give a certificate that their article did not contain any objectionable or noxious ingredient, but he did not know whether they were prepared to go farther than that, but up to that point he believed they would be most anxious to disassociate themselves from those who sold and put forward quack remedies with absolutely unjustifiable claims. The new patent medicine stamp, which was just about to be issued, would make it clear that the Government did not guarantee the contents of the package.

Mr. CHARLES E. HECHT, Secretary of the National Food Reform Association, spoke in support of the resolution. The great need and incentive to reform in this matter would be inquiry, public inquiry that would draw attention to the matter in the most public manner, because it was entirely to the education of public opinion in this matter that they had principally to look with regard to reform on this subject. Much useful inquiry had been undertaken with regard to this matter, and he

informed the meeting what was being done in Germany, France, and the United States to check the evils complained of there, and it was hoped that in England ere long the Government would find time to take up this most important question.

Mr. R. A. Robinson also gave support to the resolution, and said he was glad to be able to congratulate the Conference on the practicability and usefulness of the first resolution proposed under this new Practice Section. It was one of great importance, and one that was calculated to put them right both with the Government and with the medical profession. Who would deny for a single moment that it was desirable they should do everything they could for the prevention of fraud and quackery? He for one disliked being in any way made the instrument for promoting the sale of those things which could be described as either a fraud or quackery. He was glad attention had been drawn to the matter, and could see no objection to any form of legitimate inquiry. The specious way in which these things were advertised did great harm, and that they had to deal with things which were puffed with such glaring and fraudulent statements did not give them respect or add to their esteem in the public eyes, and he would be glad to see them swept away. The retailing of these things was an illegitimate form of pharmacy; something that could be done by an unqualified person, and this resolution at least would show that they did not desire the continuance of that system. He should give it his most unqualified support.

Mr. C. T. Allen thought it was not well for chemists to allow themselves to be advertised as being agents for this or that proprietary of doubtful character, as in doing so they were acting against their own best interests. They ought to refrain from dealing in avowedly quack medicines of the kind complained of, and certainly they ought to refuse to have their name associated with the advertisement of any such medicine, for that appeared to be the latest method of advertising and bringing prominently into notice these preparations.

Mr. Edmund Jones regretted that in some districts, and particularly in the Pottery districts, where he resided, chemists did not get enough dispensing to make them independent of these ready-made medicines, owing to the practice of doctors of those parts dispensing their own medicines. That was particularly his case, and in order to maintain his ground he had had to put up a proprietary medicine of his own. Was it suggested in the resolution that in such a case a pharmacist was guilty of quackery? The medical men

would doubtless call it quackery. Probably they had no right to do such a thing, but what were they to do where they had not enough dispensing to keep the business going. They must in that case resort to the sale of proprietary articles. In spite of that he was, however, in cordial sympathy with the resolution, and would like to see some precautionary measure taken by a joint committee of pharmacists and medical men to consider the matter with a view to the abolition of the evil complained of, and he suggested that the British Medical Association, or some Government Department, be approached to determine whether the formula of such proprietaries should not be registered, without publication, and in that way the owners of proprietary articles could satisfy the Department as to the beneficial character of their preparations.

Mr. Middleton said a chemist making up his own preparations in his own pharmacy, as the last speaker did, would not come within the scope of the resolution at all, because it could not be said that he was guilty of any form of "fraud and quackery." The object of that motion was to prevent the public from being poisoned with noxious compounds of unknown quantities. He had several preparations with which he supplied his customers, but he did not think that any of them regarded him as a quack on that account; he had the greatest confidence in his customers, as be believed they had in him.

Mr. Wm. Browne said the quack medicine owed its great popularity to the cleverness with which it was advertised. He did not quite agree with Mr. Harrison in his suggestion that if they were to do away altogether with the proprietary medicine they would get self-drugging, which would be worse, because if people took their drugs direct they would know what they were taking, whereas in patent medicines they did not. The book *Secret Remedies*, he thought, did a lot of good, and he would like to see a second edition brought out; he was inclined to think it would be a very good thing to have the ingredients of these patent medicines declared, and he agreed with the speaker who had condemned the practice of chemists allowing their names to be associated with these advertisements.

Mr. J. R. Hill said it should not be thought they were going to claim for qualified pharmacists a liberty which they would not allow to others, but the resolution involved no such claim, because it struck only at the advertisements which advertised the sale of "secret medicines" the sale of which involved fraud and quackery. If any registered pharmacist advertised and sold

a secret medicine in such a way as to involve fraud and quackery, why, then, they would entirely condemn him, too ; but in such a motion as this they did not touch the bigger question of a chemist's own proprietary medicine.

Mr. J. C. Pentney thought they were overlooking the mischief that was being caused by medical men prescribing tablets and things of that kind, from which, he believed, chemists suffered more than they did from the sale of patent medicines. An immense amount of money was made over the sale of patent medicines, and in whatever steps they took against that trade they must be reasonable, and allow the owners a reasonable time in which to reap the fruits of their invention, for he knew there were some who owned proprietary medicines that did not make an undue representation as to their virtues.

Mr. H. Kemp did not think a declaration of ingredients would prevent the public from being gulled, nothing less than the resolution as it stood would serve to do that, or to defend the legitimate rights of the doctor and the pharmacist, and in that he would be supported by both those sections.

Mr. Harrison replied to the discussion, and the resolution was then put with a slight amendment, and was as follows :

> "This meeting of the British Pharmaceutical Conference is of opinion that a public inquiry by a Royal Commission, a Select Parliamentary Committee, or a Departmental Committee should be held in regard to the advertising and sale of proprietary secret medicines and the law relating thereto, with a view to further legislation for the prevention of fraud and quackery."

With this amendment the resolution was carried unanimously.

Mr. W. F. Wells in the chair :—

THE EDUCATION OF THE PHARMACIST FROM THE POINT OF VIEW OF THE TEACHER

By F. Beddow, D.Sc., Ph.D.

The present system of educating the pharmacist is by no means an ideal one from the teacher's point of view. In a large majority of cases the student starts on his career without any knowledge of the work he is undertaking before he can become a qualified chemist ; and usually his preliminary education is inadequate for

the amount of knowledge which has to be built upon it. The first requisite is that the future pharmacist should have passed a suitable preliminary examination before becoming apprenticed; this presents far less difficulty now than it would have done a few years ago. The local authorities have encouraged the establishment of efficient secondary schools in so many places that every boy and girl capable of taking advantage of higher education can obtain it; and in the country the county councils are offering scholarships and paying the railway fares of those whose parents are too poor to do without this help.

The student should make up his mind at least a year before leaving school that he wishes to become a pharmacist; he can then have time to study the small amount of Latin necessary to understand the technical terms of his profession. Under the present system the standard of the Preliminary Examination is considered by some pharmacists as too high, but it must be remembered that any lowering of this standard would tend to lower the prestige of the profession, especially now that tradesmen like grocers and plumbers are realizing the advantages of better education and taking fuller advantages of the facilities offered. I believe, personally, that it would be easier to get apprentices if the Preliminary Examination had to be passed on leaving school. Headmasters of secondary schools would have a definite goal to prepare for, and would be more likely to persuade suitable boys to join the class preparing for this examination than at present, when boys are often taken direct from the elementary school, and the result is the secondary schoolmaster dissuades his scholars from competing with boys of less education. It would be to the advantage of the profession if no apprentice was taken without a premium, however small, and, in return, a clause was inserted in every indenture that the apprentice should have time allowed during the day for attending classes and for private study. I feel convinced that the difficulty which some pharmacists have in obtaining apprentices is due to the long hours they expect them to work without time for study. If any addition is made to the subjects of the Preliminary Examination, book-keeping should be one of them; it is a subject with which every one in charge of a business should be acquainted.

Having passed a suitable preliminary examination and being apprenticed, the student should be encouraged to commence at once to study for the next examination. Under present conditions a large majority do little or nothing until they are

getting old enough to sit for their final examination ; they try to compress all their work into a few months spent at a school of pharmacy. The result is a process of cramming, ending frequently in a series of failures. Under these circumstances, it is not to be wondered at that the examination is often regarded as a necessary nuisance, and the subjects studied as of no value.

The educationist wishes to see this system abolished ; he also considers examinations a nuisance, but unfortunately there is no other way of testing if a student has had a suitable education. As far as possible he would like to minimize the importance of the examination, and increase the importance of the education. The proposed curriculum is a step in this direction ; it substitutes to some extent proof of education for examination. It will, therefore, be welcomed by all educationists. Most of the objections raised against it can be met. First, with respect to students living in the country. In these days there are few small towns or even villages without science classes, and if they do not exist the local education authorities are usually willing to help where there is a real demand for education. In fact, the difficulty is not to get education, but to persuade people to take advantage of it when it is offered. Even if there are no classes in the actual town or village, the cost of railway fares to the nearest centre would cost less than the amount paid by the average student to spend four months at a school of pharmacy. Secondly, although many capable and able students have been able to prepare for the examination by private study, it is not an ideal system, and inferior to the enthusiasm which can be infused by personal contact with a good professional teacher. The whole tendency of modern education is against what has been called by one of our leading educationists " garret-room knowledge."

In very exceptional cases where a pharmacy exists in an out-of-the-way place, and the owner wishes to take apprentices and is willing to fit up a suitable laboratory and to undertake teaching, such a pharmacy might be licensed. At present it would be advisable to recognize as many teaching institutions as possible, but none without a proper inspection.

With respect to the division of the present Minor Examination into two parts, this is certainly a step in the right direction. It makes the examination easier, but, from the point of view of the educationist, this is an advantage if it helps the student to concentrate his energies on gaining a thorough knowledge of the sciences—chemistry, physics, and botany—necessary for a good

understanding of the technical part of his work. The number of hours the student should attend lectures and practical work might be calculated on the basis of four to six hours a week for three sessions of forty weeks each, according to the amount of time the members of the profession feel they can spare their apprentices. In Portsmouth the matter is under consideration, and it is hoped to arrange clasess for six hours a week—two hours in a morning, two in the afternoon, and two in the evening—on different days. This arrangement will suit the pharmacies in different parts of the town ; in some the least busy time being the morning, in others the afternoon or evening. On this basis the student would get $6 \times 40 \times 3$, or 720 hours' tuition in the three years. It would enable him to attend three courses in chemistry of forty lectures each, on the non-metals, the metals, and organic chemistry respectively. The practical chemistry would be for two hours a week for forty weeks for three years. The botany lectures would be eighty, and the practical work 160 hours. The physics would require twenty lectures, the practical work being included in the practical chemistry. This would slightly increase the number of lectures above that suggested by the Committee, namely, 120 lectures in chemistry, against 100 ; 80 lectures in botany, against 50 ; 240 hours' practical chemistry, against 300 ; 160 hours' practical botany, against 25.

Twenty-five hours for botany is far too little, the practical work requiring nearly twice as much time as the theoretical. Little but praise can be given for the present syllabus, but if any alterations are made I would suggest that in botany a modern system of classification might be substituted for that of Bentham and Hooker. So many plants have medicinal properties that it is highly desirable for the student to have a sound knowledge of the technical description of plants, and a thorough acquaintance with the natural orders containing the chief of such plants. The section of the syllabus on " classification " deals with this. The wording of this section is vague and inconsistent. The student is required to know the " characteristic features " of the four main divisions of the vegetable kingdom. For the general student such vagueness leads to unnecessary work ; unnecessary, that is, for the purpose for which he is studying botany. This is the more deplorable when it is remembered that his examination is an oral one, in which accuracy of information and well-marshalled facts are essential. Such can only be obtained in the limited time at the student's disposal by giving definite types of

each of these divisions to be studied, as is the case in the London Intermediate Examination. The seven great series of natural orders as arranged by Bentham and Hooker are mentioned for study, i.e., the whole of the English flora presumably. Eight natural orders are specified for study, only four of the seven series being represented. Presumably the eight orders detailed are for special study, whilst a general knowledge of the orders belonging to all the series is required—a task of considerable magnitude. Here it is desirable that the student should be given a few orders to do thoroughly, or else—and preferably—be required to identify flowers by aid of a flora. The latter task, though extensive, is probably of more use than the detailed study of a few orders, and would assist him in identifying many plants of value medicinally. The work in vegetable histology is adequate, but the growing importance of the microscope in chemistry, and bacteriology as well as botany makes it desirable that this portion of the syllabus should be tested practically, as well as by identifying and describing prepared slides.

The present inorganic chemistry syllabus is satisfactory, as it includes most of the chief subjects usually dealt with in a two years' course on this subject, but in organic chemistry, which is probably more important to a pharmacist, many important classes of substances are omitted, such as the carbohydrates, the alkaloids, etc., although the candidate is expected to know the tests for these substances. I should therefore like to see included in this part of the syllabus the chief sugars, starches, alkaloids, urea, and a few more aromatic compounds like camphor, turpentine, etc. In the practical examination inorganic and short organic preparations might be demanded, also volumetric and simple gravimetric analysis. All assay of drugs should be left to the second part.

The subject matter of the present physics syllabus is chiefly theoretical mechanics. I should like to see included an elementary knowledge of specific and latent heat and conduction of heat, the simple laws of light, lenses and mirrors, the construction of a galvanic cell, the galvanometer. Every student should be expected to keep accurate note-books of his practical work in botany, chemistry, and physics. This in itself tends to make the student careful and accurate, but if these note-books are certified as correct by a responsible teacher, and presented to the examiner, they should prove of great help to him in his estimate of the student's attainments. With respect to the final, at least one year should

intervene after passing the first part before a candidate be allowed to sit for this examination, and proof that he has attended classes in materia medica, practice of pharmacy, and prescription reading should be demanded. These classes may be attended during the time the candidate is an improver. Institutions capable of giving suitable instruction are at present few, but I feel sure if a demand was created local education authorities would respond, and many pharmacists would have an opportunity of conducting classes with suitable equipment under much better conditions than can be supplied on their business premises. The syllabus at present in use will require little amendment; it has been drawn up carefully by those best able to judge the requirements of the profession. I believe revision of the Major Examination syllabus is not at present under consideration, but when this comes before the Committee it will probably make radical alterations, introducing bacteriology in place of part of the botany.

In conclusion, I should like to repeat that in making any changes I hope that the education of the student will be considered as the important thing and the examination as of secondary importance, and that regulations will be made ensuring that successful candidates shall have received such an education as can be obtained without excessive cost to themselves or detriment to the profession in obtaining apprentices. I hope the present system of testing candidates by oral and practical examination will be retained, as I have found it very successful in the past and that the written examination and the production of note-books will be looked upon as an additional help in deciding the candidate's qualifications.

Discussion

Mr. A. E. Hobbs said that many pharmacists realized the truth of what Dr. Beddow had said about many of the youths that came to them as pupils, and would be glad to hear of something that would remedy things. He believed one reason was that many of them came too late. He agreed that it was necessary to have a curriculum beginning with the period of apprenticeship, and they should see to it that the Preliminary Examination was made before the boy was apprenticed, and that he started his technical career with his elementary training in the background. In that they might take a lesson from the grocers, who were taking infinite pains to inculcate a technical knowledge of their trade in their apprentices and assistants, and were holding classes

to that end all over the country. In that way they were making themselves most efficient in their calling, and were acquiring a thorough knowledge of the goods that they handled over the counter. It was necessary they should deal with the matter in the same way, and he suggested that in whatever curriculum they adopted they should take care not to ignore the commercial aspect of the business. Many lads when they apprenticed themselves to a chemist seemed to think there was no business aspect of the question at all; that they were to have nothing to do with commerce, but they had simply to get their qualification, whereas he ventured to suggest that before the question of apprenticeship could be seriously considered they ought to have had a sound commercial education. They should be taught to realize that nowadays they would need to be keen in business; having that knowledge, if they had a technical training too, it would be a further asset in their favour.

Mr. J. H. Cuff said that those of them who wanted to take an apprentice were only too anxious to do the best they could for him. The suggestion to frame the curriculum to suit the conveniences of the trade was a good one. Other trades were doing what they could for their young men in the acquisition of technical training, and the chemists ought not to be behind others. It behoved them to keep up their studies, lest they be outclassed by them.

Miss Buchanan agreed that they wanted a higher standard for entrance to the Preliminary Examination than they had at present, and it would be better to make the compulsory training run parallel with the training in the shop, for where the student was trained only in the laboratory of the technical college they acquired habits of wastefulness in the materials they used that were being paid for by any one and no one in a way that would never be permitted in a shop where everything had to be bought by the proprietor. If their training were made to run parallel with their apprenticeship they would bring to bear on their college studies the practical knowledge they were acquiring in the shop, and it would be to their ultimate benefit. Practice would then illustrate the theoretical work they were doing in the college. She agreed that part of the examination should be a written examination; there should be practical work and papers written on the theories.

Mr. W. Nimmo suggested that whilst a curriculum was mainly for the college or institute, such a curriculum might be framed that

those who desired to teach pharmacy in their own pharmacies might be able to do so.

Mr. MABEN thought colleges would continue to be a necessity even if such curricula were arranged, because every gentleman might not feel himself competent to teach his pupils in the manner desired. Dr. Beddow had explained views with regard to the curriculum to which he himself had given expression on former occasions, in that the teaching of the curriculum should be spread over so many years of apprenticeship, and not crowded into one session before the examination. Such a curriculum would result in a class of more highly-trained pharmacists than they had got under the present system of leaving the entire training to the end of the apprenticeship. The question was what were they to do in the remote country districts where they had not the educational facilities of Portsmouth and other large towns? He recommended the Local Associations to organize and develop such facilities through the educational authorities.

Mr. RUTHERFORD HILL, having had some experience of the teaching of youths, agreed with Dr. Beddow as to the unsatisfactory nature of the present day material; his preliminary education was defective, but it was not altogether his fault. It was not altogether the educational deficiencies of the boys which made it so difficult to get apprentices, the remuneration had to be considered. If they considered what an apprentice had to face in order to qualify himself for a pharmacist, and then consider what his prospects were when he had qualified, they would at once recognize that there were many other professions which, from a pecuniary point of view, were more tempting, and which did not call for the same course of study at the outset. And then, if they were to offer better hours, they would stand a chance of getting more and better apprentices. In small towns, too, it was absolutely impossible to get the facilities for giving the technical instruction and for their carrying on their scientific studies, and therefore in such cases it was quite necessary for the apprentice to complete his apprenticeship and then go to a college and carry on his scientific studies. Of course, in a town like Portsmouth, with all its facilities, Dr. Beddow's suggestion would be best.

Mr. A. R. SMITH said that the first thing an aspiring pharmacist should do should be to pass a good preliminary examination, but there were those for whom the time spent in the college precints was not sufficient, and therefore these would need extra

facilities for study and for carrying out their work. Good laboratory experience, too, was necessary for the student, but men could read up their theory without being obliged to attend certain lectures.

Mr. FINNEMORE said he personally would not be sorry to see the elimination of Latin altogether from the Preliminary Examination. The little Latin that was found in prescriptions nowadays seemed to him no argument for retaining it as a necessary branch of the preliminary education. He thought that in England there were abundant facilities for the student obtaining all the training necessary, and all the difficulties of training would be overcome by the adoption of some such scheme of concurrent curricula as suggested by Mr. Gadd some years ago. They needed a scheme whereby the youth should attend classes during the years that he was undergoing his apprenticeship. As to the division of the Minor Examination, he was in thorough accord with Mr. Smith that if they divided the examination they must increase its scope, otherwise division would result in a lower standard, and that they could not afford.

Mr. HARRISON agreed that an apprentice should do his training during his apprenticeship, and should be afforded facilities for attending the technical college. If pharmacists took fuller advantage of these municipal colleges they would be able to get better training for next to nothing.

Mr. W. F. WELLS continued the discussion on the lines set out by Dr. Beddow, whose opinion, he said, he entirely agreed with. The failure of the present system was a great want of training in business methods, and if those who took apprentices would pay a little more attention to that it would be better for the boys.

Dr. BEDDOW, having replied, was cordially thanked for his instructive address.

Mr. J. C. UMNEY in the chair:—

NATIONAL INSURANCE BILL

The Chairman explained that they wanted at that meeting to confirm a conclusion that the Conference had come to in committee, acting in conjunction with a committee of the British Medical Association, and they were particularly anxious to confirm this conclusion, because the British Medical Association had not done so.

Mr. PECK read the recommendations as set out in the report

of the Executive Committee, page 379, and Mr. F. W. GAMBLE then moved : " That this meeting of the British Pharmaceutical Conference approves the recommendations passed by the Joint Standing Committee of the British Medical Association and British Pharmaceutical Conference at its meeting on June 15, 1911."

Mr. R. R. BENNETT seconded, and the motion was unanimously carried.

Mr. R. A. ROBINSON suggested that all present should send a telegram to the Chancellor of the Exchequer and to their particular M.P. on the subject, and he read a form of telegram which the Secretary had prepared as suitable for sending to the members of Parliament whom it was sought to influence. The telegram was as follows : " Trust you will support Glyn Jones's amendments to Clause 14 Insurance Bill for supply of medicines by duly qualified pharmacists. British Pharmaceutical Conference in session addresses Lloyd George on subject."

The message proposed to be sent to Mr. Lloyd George was as follows : " The British Pharmaceutical Conference at its forty-eighth annual meeting, present pharmacists from all parts of the United Kingdom, and representatives from colonies, ask your earnest consideration and support of the principle regarding supply of medicines advanced by the General Medical Council and Pharmaceutical Societies of Great Britain and Ireland. The Conference trusts that such supply will be arranged by Health Committees with duly qualified pharmacists, subject to Pharmacy Acts provisions, as embodied in Glyn Jones's amendments."

The members present unanimously agreed with the suggestion, and telegrams were despatched accordingly.

Mr. EDMUND WHITE said that the Legislature in 1868 entrusted the Pharmaceutical Society with the educational administration of matters of pharmacy, and for a matter of fifty years they had been dealing with those matters, but unless pharmacy was recognized by the Government in this Bill all that became useless, and they might as well throw the whole thing up, and refuse to take part in the educational advancement of pharmacy, for what would it avail them if after they had trained themselves, and qualified themselves for that special work it was to be taken out of their hands ? What was the good of the Act of 1868, what the good of their Preliminary Examination, what the good of three years' apprenticeship, and the education and training which followed ? And if they were not recognized in this Bill, he coun-

selled them to make no further move in pharmaceutical education, for it was not worth it. Unless they got proper recognition and support it was no good going on. Then the condition of pharmacy would become worse than it was before 1868.

GENERAL BUSINESS

Thursday.

Presentation of Books

The President, addressing the Chairman of Portsmouth Association, asked him to accept, on behalf of the Bell and Hills Fund, a number of books for the Association library. The books consisted of Remington's *Pharmacy*, White and Humphrey's *Pharmacopedia*, Blythe's *Foods*, Strasburger's *Botany*, *Homœopathic Pharmacopœia*, the United States *Dispensatory*, Greenish's *Materia Medica*, Dixon's *Pharmacology*, Glyn Jones's *Poisons and Pharmacy Law*, and a set of the *Year-Books*.

Mr. T. A. White in acknowledging the gift of books, stated that their intention was to provide that they should be available to every assistant and apprentice in the district.

Invitation to visit Edinburgh

Mr. Thomas Stephenson, on behalf of Edinburgh pharmacists, gave a cordial invitation to the Conference to visit Edinburgh next year. He pointed out that it would be twenty years since the Conference last visited the Scottish capital, and assured the members that they would receive a hearty welcome. Mr. Dott and Mr. Rutherford Hill heartily supported the invitation.

On the motion of Mr. Umney, seconded by Mr. Harvey, of Cork, the invitation was unanimously accepted.

List of Officers

The following list of officers were then elected for 1911–12—President, Sir Edward Evans; Vice-Presidents, Messrs. C. B. Allen, J. P. Gilmour, Sir Wm. Baxter, Prof. Greenish, Messrs. Edmund White and J. Laidlaw Ewing; Hon. Treasurer, Mr. J. C. Umney; Committee, Messrs. F. W. Branson, E. F. Harrison, H. Wippell Gadd, D. Lloyd Howard, F.W. Gamble, R. R. Bennett, C. A. Hill, Peter Boa, J. Rutherford Hill; Hon. General Secre-

taries, Messrs. E. Saville Peck and H. Finnemore; Hon. Local Secretary, Mr. Thos. Stephenson; Auditors, Messrs. I. Bourdas and R. A. Robinson.

Mr. Hobbs proposed the reappointment of the Joint Standing Committee, to consist of the following members: Messrs. Gadd, Druce, Wells, R. R. Bennett, McMillan, Gamble, C. T. Allen, Clague, Tocher, R. Wright, and the two Hon. Secretaries. Mr. Whigham seconded, and the resolution was carried.

Votes of Thanks

Mr. Ransom proposed a hearty vote of thanks to the Mayor of Portsmouth for his hospitality, Mr. Browne seconded, and it was carried with enthusiasm.

The Dockyard authorities were thanked on the proposition of Mr. F. W. Gamble, seconded by Mr. Middleton. The kindness of the educational authorities, the Prinicipal of the Muncipal College (Mr. Oliver Freeman), and the Vice-Principal (Dr. Beddow), was acknowledged. Dr. Beddow, in reply, said that it had been a great honour to have the Conference at Portsmouth, and he thanked them for the prominence given by the members of the Conference to the question of educating young chemists.

The greatest enthusiasm was produced when Mr. E. Saville Peck proposed the thanks of the Conference to the local Committee. Special mention was made of the work of the Local Secretary (Mr. T. O. Barlow), the Chairman of the Committee (Mr. T. A. White), Mrs. White, Miss Hooper, and Mr. W. A. Bell. When Mr. Barlow rose to return thanks he was loudly cheered. He said the work right through had been a very great pleasure, because of the ready assistance that had been given them on every hand.

The President was also thanked most heartily for his services in the chair, on the proposition of Mr. T. H. W. Idris, J.P., seconded by Mr. E. F. Harrison, who said that if that were "Irish Dictatorship" he hoped they would have more of it. Mr. W. F. Wells, in response, said that the duties of the President were made very light by the Secretaries.

The Press was also thanked, particularly the Editor of the *Pharmaceutical Journal* for the reprints of the papers, on the motion of the President.

A vote of thanks was passed to Mr. E. W. Pollard for his help in arranging the visit to the Isle of Wight.

THE SOCIAL GATHERINGS

On Monday evening, July 24, the Mayor of Portsmouth (Alderman T. Scott Foster) welcomed the members of the Conference at a reception in the Town Hall. The guests were received by the Mayor and the Misses Scott Foster (who acted for the Mayoress). The MAYOR in a few words of welcome pointed out the unique features of Portsmouth and hoped that the meeting would be profitable and interesting. A programme of music was rendered by Miss A. Sawyer's band.

On Tuesday morning, after the President's address, those ladies who were not interested in the "science" papers visited the Gun Wharf Museum, and afterwards proceeded to view some of the many historic sights of Portsmouth. In the afternoon the party visited the Royal yacht *Alexandra*, and was shown over the private apartments of the King and Queen.

BANQUET IN THE TOWN HALL

On Tuesday evening the local Committee entertained the members of the Conference at a banquet in the Town Hall, Mr. T. A. WHITE presiding. The fine hall, the arrangement of the tables and the floral decorations called forth the unstinted praise of all present. At the conclusion of the banquet there were some interesting speeches, and the guests were delighted by an ably rendered musical programme.

VISIT TO THE DOCKYARD

On Wednesday afternoon the members visited the Dockyard, and were highly interested in the latest developments in the building of battleships. A thorough inspection was made of the *Hercules*, which was almost ready for commission, and great interest was evinced in the submarines and torpedo destroyers in dry dock. After visiting the workshops the party proceeded to the Town Hall, where tea was served.

On Wednesday evening the members were entertained at a Conversazione by the Principal (Mr. O. Freeman) and staff of the Municipal College. Mr. Freeman received the guests, and the various departments of the College were thrown open for

inspection. Vocal solos were sung by Miss Flanders, Miss Violet Love, Mr. Crossley-Holland and Mr. Thos. Stephenson. Mr. A. H. Davies, B.Sc., gave an interesting demonstration of high frequency electrical discharge effects.

Visit to the Isle of Wight

On Thursday morning, after the closing sessions of the Conference had been held, the members left for Ryde. The party proceeded thence by coach to Carisbrooke Castle, where a marquee was erected in which luncheon was served. After the luncheon the party was photographed and then proceeded by coach to Shanklin, where tea was taken. The drive from there to Ryde in the cool of the evening was most enjoyable.

Smoking Concert

On Thursday evening a farewell smoking concert was held in the Esplanade Hotel, Mr. R. A. Robinson, J.P., D.L., in the chair. Although the day's excursion had proved very tiring owing to the excessive heat, the proceedings went with a swing and the hearty singing of " Auld Lang Syne " concluded a very delightful day.

LIST OF MEMBERS ELECTED DURING THE YEAR

Date.	Name and Town.	Proposed by
5, x., 10.	Attenborrow, J., Melton Mowbray	Hon. Gen. Secs.
	Cresswell, E., London	,,
	Cooper, J. W., Bedford, Cape Colony	,,
	Douglas, J. W., London	,,
	Evans, J., Cambridge	,,
	Sharvill, F., Staines	,,
26, i., 11.	Anklesaria, J. D. E., Ahmedabad	Mr. R. R. Bennett.
	Arnold, S., Southsea	Mr. T. O. Barlow.
	Atterbury, W. R., Southsea	,,
	Breakspear, A. E., London	Hon. Gen. Secs.
	Baker, C. H., Cosham	Mr. T. O. Barlow.
	Donaldson, G., Portsea	,,
	Durrans, T. H., B.Sc., London	Hon. Gen. Secs.
	Hoit, A. H., Southsea	Mr. T. O. Barlow.
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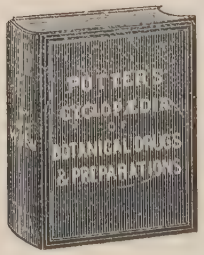

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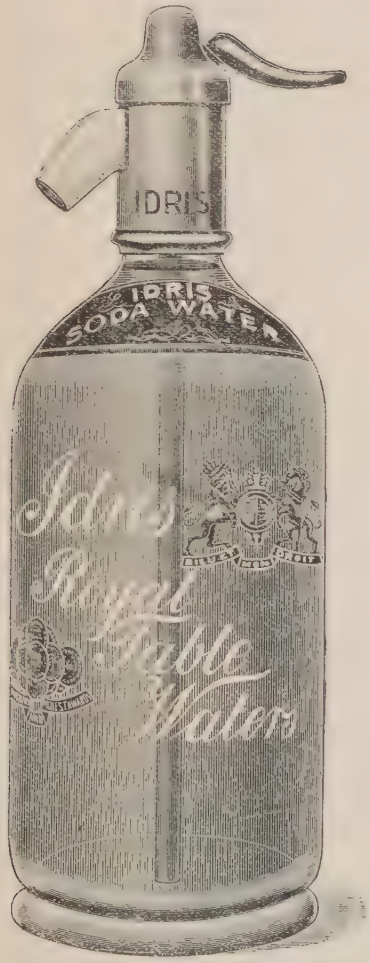

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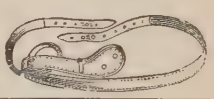

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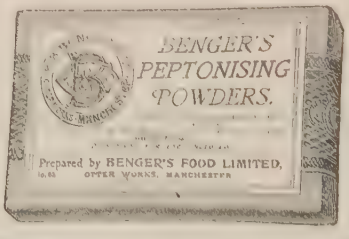

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